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INCLUDING THE PROCEEDINGS OF THE ROYAL GEOGRAPHICAL SOCIETY.

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The
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A JOURNEY THROUGH ABYSSINIA TO THE NILE.*

By HERBERT WELD BLUNDELL.

The establishment of a British Legation to the court of King Menelik, one of the important results of the English mission under Sir Rennell Rodd in 1897, gave me the opportunity of first visiting Addis Abbeba last year (1898) in the spring, when I obtained permission to accompany Captain J. L. Harrington on his journey to take up his appointment as diplomatic representative at the capital. Our route was that taken by the English mission from Zeila *viâ* Harar, well and fully described by Count Gleichen in his 'English Mission to King Menelik.' The delicate position our envoy was placed in made it impossible for me to suggest a journey I had long contemplated through the southern zone of Abyssinia to the Sudan. The journey, however, not only gave me an interesting experience of Abyssinian life and court and military ceremony, but ample opportunity of making inquiries and arrangements for future travels.

In spite of its want of a good harbour and any natural advantages, Zeila still monopolizes, through sheer good management, the confidence of traders and assures the security of the caravans. On the other hand, Jibuti, only 25 miles to the north, with the finest harbour in that part of the coast, does one-tenth of the trade, with the help of (or, according to their compatriots, in spite of) just twenty-six times as many *fonctionaires*. This elaborate administration has operated in such a way that merchants and camel-owners are most averse to coming into the

* Read at the Royal Geographical Society, December 11, 1899. The map will be published in the next number, along with the Appendix to the paper.

town. In the last few years the road has been enlivened by raids and massacres on a large scale, while a regular war has been going on between the tribes on each side of the route, the Black Isa and the Danakils, who both combine to threaten the French settlers. The railway in slow course of construction is a constant source of irritation to the other local tribes, who are mostly camel-owners; this year it culminated in a regular attack on the workmen, resulting in the murder of a European and fourteen navvies and a threatened assault on the town itself. The railway has only reached its twentieth kilometer or so, but if completed will entirely destroy the trade of Zeila.

The road from Zeila to Harar is about 180 miles, as compared to 220 from Berbera, and will always command the traffic until a railway

TRIAL BETWEEN TWO SOLDIERS: ONE ACCUSES THE OTHER OF COWARDICE IN BATTLE.

is built connecting it with one of the good harbours, Berbera or Jibuti, and according as the former or latter is the first in the field, the trade will be absorbed by the English or the French.

On arrival at Harar, we found Ras Makunen, Governor of Harar, was away on an expedition in the very direction I afterwards travelled, in the Beni Shongul country, so that to my regret I had not the pleasure of seeing this general, who is almost universally regarded as the coming man of Abyssinia. We therefore pushed on to Addis Abbeba, arriving there in sixteen days (about 260 miles), on April 19.

The first appearance of the representative of the British Empire in Addis Abbeba was not impressive. We pushed on ahead of the caravan, and arrived like a flock of half-drowned hens wading through such a sea of mud, as a continuous sheet of water (a sample of what are

flippantly called the "light rains") could transform an extraordinarily rich and thirsty soil. We were obliged to beg for a couple of days' grace for the prosaic business of drying clothes and luggage, and furnishing the large round empty hut assigned to us, an operation performed by dividing up the space and extemporizing packing-cases into divans and cupboards. The third day the king sent word that he would receive the envoy in state at his palace. The reception took place about nine o'clock, but at early dawn our compound was surrounded by a variegated mob of men armed with samples of all the guns ancient and modern, dressed in flowing shammas ornamented by a broad red stripe. Among them appeared officers with brocaded shields overlaid with gold

MONEY-CHANGERS, BLOCKS OF SALT BEING CURRENCY, FIVE TO A DOLLAR.

and silver on their arms, and mounted on fat mules gorgeous with brass and silver trappings. Interspersed were the men of distinguished service—lion-killers with a fringe of the animal's mane round their heads like a blonde wig of a bald-headed comedian; elephant-killers with chains hanging from their ears; and warriors with feathers and bangles awarded for various feats of prowess.

As we proceeded out of our gates a rough but picturesque order was formed. Ourselves (Mr. Harrington, myself, and the interpreter) rode in the centre, attended by a large escort and the special bodyguard of the king, with muskets in red cloth covers, preceded by a band of very doleful one-note trumpeters. Finally came Mr. Ilg Conseiller d'État, raised to the high rank of Betwadded ("favourite"), who has signalized himself by his useful services to the country of his adoption,

by coaching the king in all matters European, and acting as intermediary between him and foreigners. On each side the escort marched in single file, with a space of 50 yards in breadth between the parallel lines. The reception took place in a large whitewashed hall, situated on a commanding hill, and fenced by a high split bamboo Zeriba, whitewashed walls, floor strewed with rugs, and the roof of gaily coloured matted bamboo supported by wooden pillars. The officers and ministers, in full panoply of state, grouped themselves according to rank, the lines converging towards an alcove, under which, huddled between two high cushions on a throne like a richly hung four-post bed, sat the king. His majesty, though very dark in complexion, with not very regular features, has charming manners and a particularly pleasant voice, while his face is quite redeemed from the effect of the type, by a most intelligent mobile expression and an amiable smile that makes his features almost handsome. The audience was very short. The credentials were delivered and accepted with friendly expressions of the

RETURN OF ELEPHANT-HUNTING EXPEDITION.

usual sort, the (Italian) cannon boomed a salute, and the ceremony that opened a new chapter in the history of the respective nations was over.

After the opening formalities, which had led very speedily, by the good-will of the king and the tact of our representatives, to relations that promised to be of a very friendly nature in the future, it was decided to return to England before the rains (it was now May 16) were imminent. I returned with Captain Harrington, having obtained permission to make another visit and to travel in the country. Before November, 1898, my expedition was organized, and the party, consisting of Lord Lovat, Dr. Koettlitz (late of the Jackson-Harmsworth Expedition), and Mr. Harwood (naturalist), and myself had collected at Berbera by December 7. Within seven hours of landing the baggage, our caravan of camels and horses was moving out of the town to the first camp.

Somaliland—now almost as well known as Scotland as a country of sport—does not call for any description. As our route lay through the country reserved for the Aden garrison, we were obliged to possess our

souls in patience till we arrived at Harjesa—a patience that was sorely tried when a leopard entered the camp at night and killed a sheep in a zeriba in the middle of our Sudanese, and a hyæna purloined our mutton, hung a foot or two over some of our men. We took a *détour* from Harjesa to the north-west along the watershed, in order to pass through Jefa Medr and the Maran prairie, where much game was reported. We were disappointed in lion, but we got some good heads of oryx, awwal (Semmering's gazelle), and hartebeest.

The Maran prairie breaks up on its western border suddenly into mountain ranges round Harar just as the Colorado plains seem to open to let through them the great Pike's peak range of the Rockies. The first ascent is over the thickly wooded Mardo pass, leading from the summit into a fine valley flanked by bold basalt masses, that look with their perfectly horizontal courses like the breeched remains of some huge ruined rampart. Conspicuous among them is the conical pyramid of Gara Mulato to the south, and the lofty battlement of Kondora, over 10,000 feet high, to the north. The caravan route descends into a fertile valley, and emerges between their bulwarks to the last saddle, called Fyambiro, whence it winds along the spurs of Kondora to the hill on which Harar gathers the caravan roads from each point of the compass.

It would be hard to imagine a more beautiful situation for a great city than that of Harar. It stands 5400 feet above the sea, with every condition that makes for wealth and prosperity—fertility of soil, industrious agricultural population, and central position, and what is so rare in the catalogue of advantages of an African town—with an extraordinarily healthy and invigorating climate. Held by the Egyptians from 1874 to 1885, it was abandoned by us in their name, and an agreement entered into with the French by which both nations agreed to refrain from laying hands on it. No sooner had the last British soldier disappeared over the horizon than the Emir Abdullahi tore down the British flag with every insult, and declared his independence. A few months after, the Abyssinians descended upon it, utterly destroying the army of the Emir at Chelunko (three days' march on the Addis Abbeba road), and took possession of the town. Harar, in fact, is a bone dropped by England while she was growling at France, and picked from under their noses by Abyssinia.

The invasion of the Abyssinians, and a subsequent visitation of cholera, rinderpest, and famine, have practically decimated the population of Gallas throughout the whole of this region as far as the Hawash. These catastrophes, however terrible they were from every human point of view, has had the effect of restoring a country teeming with villages and closely cultivated to almost its primeval beauty of fertile valleys and wooded ridges, sleepy hollows only half cultivated by a stricken remnant of the population—tangled tropical forest and

grassy slopes succeeding one another in an endless panorama of beautiful parks.

We arrived at Addis Abbeba on January 19, and found the king was still on campaign against the rebel Ras Mangasha in the north, with a large army supporting Ras Makunen's division, who had advanced some distance into Tigrè. The king had advanced his army to Dessieh, within 20 miles or so of Magdala, and we were obliged, therefore, to make up our minds to this extra journey, it being quite impossible to make any arrangements or get necessary permits without a personal interview. The journey lay over the lofty plateau of basalt which stretches from the Danakil plains to the Blue Nile. Where the soil is sufficiently thin this shows through the surface in the form of a polygonal pavement—the exposure of the upper super-

CAMP CHELUNKO, FORTY MILES FROM HARAR.

ficies of the columnar structure. The characteristic form appears in marvellous perfection where the mass opens out into precipitous chasms 4000 feet deep, forming perpendicular walls of the typical polygonal columns, of which perfect examples are seen at Staffa and the Giant's Causeway. The country is almost entirely denuded of trees, except some few stunted mimosæ, and in the more sheltered parts kosso, the tree whose seeds supply medicine for the universal tapeworm, and in the rocky beds the quolquol, acacia, and aloe. On account of its great altitude, 8000 to 9000 feet high, the products of the warmer zone are rare. Wheat and barley are grown in large tracts, but cattle and sheep are the main wealth of the population.

Immediately we got outside the precincts of Addis Abbeba among the natives, we found our Abyssinians were in a strange country, among people whose language only a few were acquainted with. Addis Abbeba,

it must be remembered, is a new capital of sixteen years' growth, and Harris ('The Highland of Ethiopia'), in 1842, describes a campaign against the Gallas of the region undertaken by Saleh Salassie, the grandfather of the present emperor, from his then capital of Angolala. Debra Brehan, Liche, and Antotto were the next in order selected as capital. It would be more accurate to call each of these places a permanent camp rather than a city, a movable seat of government and headquarters of the army selected according to circumstances of position or surrounding advantages in the way of supplies of wood, etc.

At Dar Nebba we enter the country of the Wollo Gallas, and approach one of those colossal ravines formed by the apparent opening of the horizontal layer of basalt in the secular upheaval of the land. The effect of travelling over a dead level plain and suddenly coming to the sharp edge of a precipice, like a huge crack in the earth's crust, is very striking, and the difficulty of the roads leading in and out of such chasms may be easily imagined.

The road leads across the two almost parallel ravines of Adabai and Wunchit rivers, affluents of the Blue Nile or Abai, as it is called in Abyssinia; the central rocky partition between the two rivers being about 6000 feet high, and the edge of the plateau on each side being about 8500 feet. The beds of the rivers are about 4500 feet above the level of the sea, making sheer depth of chasms 4000 ft. The last ascent has been well called Haya Fej, or "death to the donkey," and is vividly described by Alvarez, the Portuguese envoy, in 1520, who calls it "Haya Fagi." "Coming out of this narrow pass, one travels through a loophole which is about four spans wide, and from one end to the other these clefts are all shale. I would not have believed, if I had not seen our mules and people pass, that goats could pass there in security; so we set our mules going as if one was sending them to destruction, and we after them with hands and feet down the rock, without there being any other road." Some engineering had been attempted to improve the road, but otherwise nothing had been done for 380 years to change the description.

The whole of this country has been in chronic rebellion, and was only conquered and finally pacified about twenty-two years ago. After the occupation of Magdala by the English, Menelik found himself freed from the danger of Theodore, and able to take another step in the direction of his ambitious projects by subduing the powerful branch of the great Galla tribes. The regent was the famous Queen Workitu, who had given shelter to Menelik when he fled from Theodore in 1865. She was ordered to give him up, or her son, who was a hostage in Theodore's hands, would be put to death. With wonderful courage and fidelity, she released Menelik to return to his country, and her son was put to death by the brutal king. Menelik was finally proclaimed King

of Shoa, and after more severe fighting reduced the whole province. His capital was placed at Liche, near Debra Brehan, about 15 miles to the east of our present route to the north. The chiefs of the Galla were Abba Wattò and his brother Muhamud Ali, sons of Queen Workitu. Fortifying Worro Hailo, Menelik waged desperate war with varying fortune for nearly five years, and finally gained a decisive victory over Ali, who barely escaped being taken prisoner. Menelik's cousin Mashasha then comes on the scene, backed by King John, joined his enemies the Gallas, but after severe fighting he submitted to Menelik's uncle Darghèh, Abba Wattò having, with one of those sudden tergiversations characteristic of his people, given his and his people's

A BASALT RAVINE. "DEATH TO THE DONKEY."

submission. At another shuffling of the cards Abba Wattò disappears, and Muhammed Ali is reconciled, marries a daughter of the king's concubine, turns a Christian, and blossoms forth as Ras Mikael, now governor of these very Wollo Gallas.

After Worro Hailo, always an important strategical position, the country becomes mountainous, and we pass over the shoulder of Mount Yoel, at a height of 10,400 feet, into a series of fine rich valleys walled in by wooded hills and lofty peaks. Commanding one of these well-watered valleys, on a hill 2000 feet above them, was perched the Gebi, or king's (Menelik's) camp and residence, and round it, in a succession of vast amphitheatres of hills, were grouped in concentric circles the tents of the different divisions of his army. The moment of our arrival augured

well for our cordial reception. Not only had some recent events on the Nile stimulated a friendly appreciation of British virtues hitherto somewhat overlooked, but the rebel, Ras Mangasha, finding his adherents melting away as his cause looked less likely to be successful, had tendered his submission, and a triumphant ending to an anxious campaign was in immediate prospect. Again, "the lion of the tribe of Judah hath overcome," as the royal motto runs. We were as usual most cordially received, and after an interview, during which we brought forward a request to be permitted to travel through the western frontiers of Abyssinia to the Blue Nile and the Sudan, we received permission, and promises of the necessary letters of safe conduct and recommendation to the various chiefs and officials on the route.

In order to vary the monotony of a return journey to Addis Abbeba by the same route, we determined to descend from the plateau and go back by the lower road through a series of valleys, into which the lofty tableland breaks up in Titanic steps to the lower levels of the Danakil plain. The first two days' marches took us out of the dense clouds that had hung over the whole camp and surrounding hills for several days, and we found ourselves on the river Burkenna, an affluent of the Hawash, nearly 3000 feet lower than the king's camp, among a totally different vegetation and climate. Cotton grows luxuriantly, and the people also largely cultivate millet (in Abyssinian "meshella;" dhurra of the Arabs), teff (*Poa abyss.*), and Bahr mashella (maize). Groves of limes are to be seen in abundance. The trees are olives, cypress, podocarpus, and the great *Euphorbia abyssinica*, the giant cactus, with its long green arms curved up like huge candelabra. These fertile valleys and the passes which lead from one to another have been the blood-stained zones over which the fierce racial and religious struggles have swayed since the days of Amda Sion, King of Abyssinia (died 1331), and Hag-ed-Din, the Sultan of Ifat. It was through these valleys that the Moslem hoards, under the terrible Muhammed Graan (the "left-handed"), swept through the country like a destroying fire, till, towards the middle of the eighteenth century, Abyssinia had reached the very lowest gulf of disaster in all her history.

On February 23, 1889, we left the lower country, after crossing the Robi, an affluent of the Hawash, and again ascended to the higher plateau, which for seven days had been towering over us like a black wall. We passed a monastery, Debra Sinai, enclosed in a dense clump of trees, and, after a stiff climb along a well-engineered mule-road, reached a fine level grassy plain, the district of Diff-Diff, the first camp being no less than 9500 feet above the sea. We left Ancobar, the former capital, 20 miles on our left, a dwindled town of 4000 to 5000 inhabitants, largely priests; a few industries have survived the removal of the seat of government. It was here that Harris in 1842 was

received by Saleh Salasseh, grandfather of King Menelik, and some idea may be given of the modern expansion of Abyssinia in this and the southern direction from the fact that Farri was then the recognized boundary between Abyssinia and the Sultan of Tajura, just at the foot of the plateau. Harris describes a campaign of the king at which he assisted along the very track where our road lay, against the Gallas of Germama and Finfinni. The latter is now the centre of the present Addis Abbeba. We arrived at the capital February 28.

Dr. Koettlitz, who was left in charge of the mules and horses, had made such superhuman efforts that, in a country where "next month" would correspond to the "to-morrow" of the most dilatory oriental, we were ready to start the next day but one. We had, besides our own pack-mules (about thirty-two to thirty-eight, according to the fluctuating conditions of their backs), a contract transport of about thirty mules for extra food, etc., to take us to Bilo, an important trading centre of Leka province, which was our first objective.

On March 2 our caravan passed out of the capital under the Gebi, or king's palace, which crowns the top of a round eminence, at the foot of the range on which the former capital Antotto stands, the ground sloping away to the south, but broken by the fine masses of Yarru on the south-east, and in the south by the towering cone of the sacred Sakwala. This mountain has near its summit a holy lake and a monastery of special sanctity. While we were away, Dr. Koettlitz made it the object of an interesting expedition. A spur of the Antotto range, called Delata, encloses Addis Abbeba on the west, a prominent landmark upon it about 6 miles from the Gebi being a conical hill, Managasha, or the King's Crowning, from a tradition that after a great battle a king was crowned here as conqueror over the surrounding country. The road is nearly due west, and skirts the Mecha range (practically a continuation of the Antotto hills), which, running parallel to the road on the north, slopes down to the hot and almost desert plain of Bechi, an extension of the Hawash valley. The reckless destruction of wood has cleared a space in this direction of 12 to 14 miles from the capital; but a wiser course prevails now, and wood-cutting is forbidden here except by royal permission. Along the lower slopes, however, of the wooded Mecha range the ground is cleared for cultivation, and the fertility of the soil is shown by the number of village settlements and the crops of millet, cotton, and tobacco. There is an important market, Jessaluffi, and a custom-house, this being the boundary (about 17 miles from Addis Abbeba) of Dejas Ubi's jurisdiction. He is stepson-in-law of the king (queen's son-in-law).

The next day (March 4) we passed the house and property of M. Lagarde, the diplomatic representative of France, raised, in recognition of his eminent services, to the dignity of his grace the Duke of Antotto. It is charmingly situated among the hills at the foot of the wooded

range that still flanked our road on the north, and here called the Characha hills. It faces west over the Hawash valley, which bends to the north at this point, and we passed the river, here an insignificant stream, about 75 miles from Addis Abbeba. Still keeping due west and rising slightly, we passed the water-parting of the affluents to the Hawash valley system and the Blue Nile, the Gudr river being the most important of the latter. We passed it over that rarity, a stone bridge built across a deep rocky chasm, and the river, after keeping parallel to the road for 6 miles or so, turns north by a precipitous break in the northern range, which has gradually assumed the flat-topped, rampart-like appearance of the great plateau to the east of Shoa.

The scenery from the Hawash is very fine; the mountains are clothed in wood, conspicuous being the giant long-leaved yew, called zigwa (*Podocarpus elongatus*); every foothill or valley is covered with intermittent cultivation and abundantly watered by streams running through every ravine. The face of the country everywhere shows signs of past warfare and passing expeditions. Many houses are burnt or abandoned, and much of the rich jungle is a reconquest by nature of what was formerly land covered by crops of cotton, wheat, and millet.

We arrived at Chellaha on the 8th. The village crowns the edge of the first distinct terrace by which the higher plateau descends 3000 feet to the basin of the Gibbe. This river takes its rise among the hills at the termination of the Chellaha elevated ground, which, trending to the north-west, is the extension of the water-parting between the north and south. The headwaters of the Gibbe are actually in the lofty mass of Kwunchi, which stands up out of this lower ground. The river flows at first in an almost easterly direction, and, receiving streams from the Northern (Sobu mountains) elevated plateau, turns due south and becomes the river Omo flowing into Lake Rudolf. We passed under the Kwunchi range, and in two hours' march across a valley intersected with numerous streams, we reached the Soddo range, at the foot of which, in a rich and prosperous-looking plain on the banks of the river of the same name as the town, is the local capital Bilo. From Bilo is a two and a half days' march over an extraordinarily rich country, hilly, but well watered, and in the immense depth of the soil in the valleys showing evidence of the heavy rainfall.

The country, as before, along the road shows the destruction wrought by passing expeditions, though probably this cause has not been so pauperizing as the appalling loss of cattle through rinderpest, which has in many places almost annihilated the principal wealth of the inhabitants from Harar through the whole breadth of the country. Cotton seems to grow luxuriantly, as well as tobacco. The great grass fires disfigure the landscape with patches of blackened desolation in early spring, but the

verdure that springs up with rapid luxuriance shows the value of this primitive expedient by which the natives clear the ground for grass and cultivation. The younger growth of trees gets killed off, but the great monarchs of the forest that have held out against the conflagrations stand out here and there in the landscape, and look worthy of being invested with the religious reverence which the pagan Gallas gave to certain trees. Chief among the latter is a tree that is covered in early spring with masses of white flowers of the species called "wanzeh" in Galla (*Cordia abyssinica*), while species of the giant fig ("shola") and a tree covered with blossoms like an azalea (*Sternospermum Kunthianum*), are among those most ornamental. Two and a half days' march brings us to the town of Gatama, seat of the local government under Fitaurari Waldo

LANDSCAPE BEYOND BILO.

Miskal, to whom we had letters from the king. He had been out on an elephant hunt with a small army, and had succeeded in slaying one, after one man had been wounded by an elephant, and another injured by a fellow-sportsman—the latter, I should imagine, being the most common form of casualty, judging from the numbers that assist at a battue and their style of firing. He was not encouraging as to the prospects of elephant-shooting near, but advised us to go on to Lekemti, the chief town of this district, and seat of the governor, Gabr-esgier-Gaher. We accordingly started next day, and arrived in the afternoon at Lekemti. Gatama lies south-west of Lekemti, and is situated at the edge of a high ridge separating the Gibbe from the Didesa valleys, the main direction being about north-west and south-east, and sloping to the north. The height of Gatama is 7050 feet; Bilo, 4768; and Lekemti, 6900. Immediately

below Gatama can be seen the valley of the Didesa, buried in dense forests and hot jungle; it is looked upon by the natives—as indeed it is—as a feverish tropical climate compared to the comparative coolness and perfect salubrity of the higher plateau.

Gabr-esgier-Gaher was, like most of the governors, at the wars in the west, and we soon found that his lieutenant, one Busha Groskè—a suspicious underling with the face of a prizefighter—was very anxious to escape the responsibility of showing us his chief pet preserves, known to be the great forest belt of Handuk, which fills the deep valley of the Didesa. He gave us guides to show us the way, but we suspected, and soon found out later on, that they led us away from the most likely spot, but always with the assurance that the elephant did not come up the valley as formerly, but were to be found in great quantities on the frontier near the Dabus. Lekemti is a large scattered town of some 40,000 inhabitants, situated on undulating ground, with all the evidence of prosperity. All kinds of produce, corn and honey being principal, and large quantities of cotton, native and American; iron and copper metal from the west are to be seen in the markets.

From Lekemti our road was about north-west. Gradually descending by easy gradients, in thirteen and a half hours' march we cross the Didesa, a fine river flowing through a grand gorge flanked by the mountains of Sarti on the west, and fringed on each side by dense forest and bambo jungle. The river-bank is 3300 feet above the sea. Numerous schools of hippopotami were basking within a few hundred yards of the ford, and we shot one under the impression that it would be useful for food; but the Abyssinians would not touch it, and though we tried the tongue, I can safely say I never penetrated into it far enough to be able to say what it tasted like. The natives, however, disposed of it, so that our consciences were consoled for killing an inoffensive animal that scarcely can be ranked as game.

Since leaving the first camp after Lekemti, the lower altitude and greater heat had introduced us to a quite different vegetation. We travelled through forests of Gardenia (*Thunbergia*) and Protea (*Gaguedi* in Abyssinian), a tree with a leaf like a magnolia and a large yellow blossom. The latter had bloomed soon enough to be injured by the fires, but the former were in the full glory of bloom and scent, and some of them reached the height of 15 to 20 feet, with wood 8 to 10 inches in diameter. A stiff climb out of the gorge of the Didesa brought us from stifling bamboo jungle through a splendid forest of Gardenia to the district of Merichi, where we were at an elevation of 6800 feet, and our road continued along rounded ridges nearly due west for about nine hours' marching to Siban, when it turns due north, and then continues about north-west to the frontier. The features of the country are rolling down, the contours reminding one of glacial action; the violent rains, combined with the effect of sun, producing such breaking down of the volcanic

rock as to give the effect of that agency in northern climes. The country is populous, villages being sprinkled in pretty close proximity over the country, and the ground kept clear of wood and jungle. At Mendi, forty-six hours' marching from the Didesa, we were at the frontier settlement of Abyssinia, at the edge of the next great ledge or terrace overlooking the Dabus valley and the watershed of the Blue Nile.

The journey from Addis Abbeba lay through the land of the Gallas, and it may not be amiss to take a cursory glance at their history. As usually happens, the name they give themselves is not that known to the Abyssinian and Arab Gallas. They call themselves Ilmorma, or sons of Orma, a sort of eponymous hero, who had eight sons—Borana, Tolama, Liban, Gudru, Jemma, Nonno, Hurru, and Amurru—from which descend the different Galla tribes. The word Galla itself means "emigrants" (cp. Agazi), and their natural traditions bring them from a great sea towards the tenth century. At any rate, they made their appearance on the Abyssinian frontiers about 1542. At first they were without horses and a pastoral race; when, however, they settled on the fertile borderland of Abyssinia they developed agricultural tastes, and became famous breeders of horses, and their horsemen formed an irregular cavalry that inflicted many reverses on their Ethiopian conquerors. The tribes used to elect in turn a president, "Abba-Buku," for a term of eight years; but at present, apparently, they have entirely submitted in the region within effective occupation of Abyssinian troops to local governors (who are, however, often chiefs of their own race), and Abyssinian headmen of villages representing the king, called Shums. Their language belongs to the proto-Semitic branch, and allied to that of the Somali and Danakil, and is generally divided into five dialects: (1) That of the east and north of Shoa, the Wollo, etc.; (2) Ittudia on the Somali side, and spoken by the Ittus, Arussi, Karains, and Alabas; (3) the Gojob, that spoken by those on the south, Enarea Gudru, Kucha, and Mecha, where our journey lay; (4) the Shoan dialect; and (5) the Equatorial. Their religion has been the subject of many investigations, and may be summed up as a belief in a supreme nebulous being, Wak, and below him two divinities, masculine and feminine, Aglieh and Atatieh.

The physical type varies very much according to the ground races the Gallas have been brought in contact with. In the neighbourhood of Abyssinia they are lighter coloured than the Abyssinians, and are of finer build, with more regular features. On the south such types as the Arussi are darker, and more approach the Somali type. Coming to the western border, *i.e.* Leka Gallas, beyond Bilo, there appears a light-coloured type, with mild brown eyes, fine delicately chiselled features, thin lips, broad flat foreheads, and straight profiles, strongly recalling an Indian type; a fact that, taken in conjunction with their national

traditions and the religious characteristics of South India and Ceylon, especially in the matter of tree and serpent worship, may point to a conquering people entering the east coast and assimilating with the native races. This particular type seems to correspond to that of Enarea (Narea of the Portuguese), and described by Bruce and others. Narea may have been the position where they kept themselves more isolated, and retained in consequence their racial characteristics in comparative purity.

The frontier of a country, whether coming in or going out, is generally where the traveller's troubles begin, and we were destined

TYPES AT MENDI MARKET.

to be no exception to the rule. The governor, Dejasmach Damisi, had just conducted a campaign, *i.e.* a raid through this portion of the country of the Beni Shongul, and in view of his being still at the capital Abderrahman, the king had given instructions to the local headman at Gori to hand us over to him, Damisi being enjoined to facilitate our journey to the Blue Nile. Damisi, however, had left Abderrahman and made a wide sweep through the Dinka country and the Baro to the south. No interpretation of the spirit of a document is ever, of course, possible to a subordinate. He would take us on a wild-goose chase to Damisi, but we must not go on without special permission to Abderrahman. There was no help for it but to send a mounted messenger back to Addis Abbeba, and get special and detailed permission suitable under the

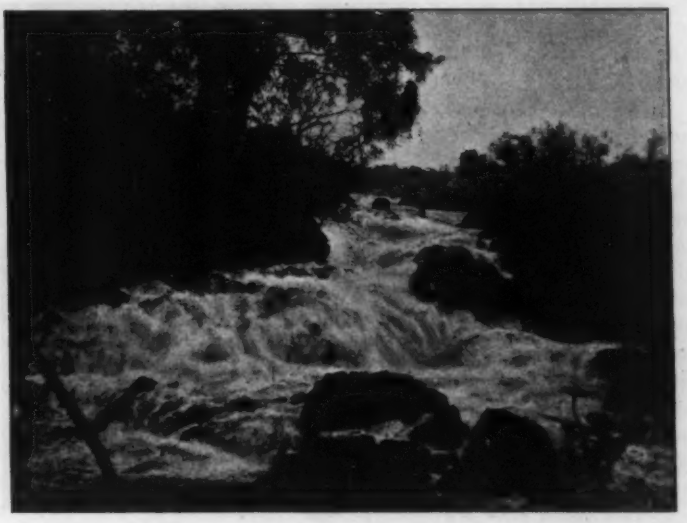
altered circumstances. The permit, however, to *faire la chasse* admitted luckily of no misinterpretation, and we were relieved to find that elephants and other game were plentiful in the valley of the Dabus which lay below the hills of Mendi, and has formed for a long time the acknowledged and natural frontier between Gallaland (now Abyssinia) and the Shankalla or negroid races of the great Nile basin.

The very next day we organized a shooting-party, and started off towards the Dabus valley, where elephants were reported, accompanied

TYPES AT A MARKET, GORI.

by the obstructive *shum*, a pock-marked ruffian, of repulsive personal habits and worse manners, and an escort of equally unattractive ragamuffins. We certainly saw many old elephant paths, but the tracks showed that they were mostly made during the rains, when it is probable the animals come up into the higher ground from the south-west Dinka country, where the gun has not yet penetrated in large numbers, and where it is well known that they still roam in large herds. Several long and fruitless days were spent in trudging over innumerable tracks in stifling bamboo jungles, but no fresh ones appeared until one day a

party of our caravan disturbed, and were much disturbed by, a herd of about twenty. Word was brought to us, and though we took up the tracks at once, they had too good a start, and getting another fright they got away far enough to make pursuit hopeless for that day. The next day proved again a blank, but the next, when out by myself, I was surprised at lunch by a very big "rogue" sauntering along with an easy roll through the bamboo not 250 yards off. He got our wind enough to be startled out of his quiet stroll into a quick walk, and gave us a pretty hot run to get up to him. I got a good shot behind the shoulder, not being able to see his head as he stood behind a clump of bamboo. He turned away evidently hard hit, and gave me another chance about



FALLS OF THE DABUS.

200 yards further on, when he went on and hid in a very dark jungle of young growing bamboo. Out of this he suddenly turned and charged, but instead of charging home he swerved away at about 30 yards and gave me a good side shot, which brought him up standing, and after making an attempt to turn at me, he rolled over on his side. He proved to be a very large specimen, 11 feet 11 inches * measured to the top of the shoulder; this is bigger by 10 inches than any recorded, so far as I have been able to find out, except one shot by Mr. Foa, and given in his late publication, 'After Big Game in Central Africa,' at

* This measurement was taken lying down; the compression of the foot in a standing posture would reduce this by 3 to 4 inches.

12 feet 2½ inches. The next day both of us went out, and Lord Lovat took on a fine active female with a good shot between the eye and ear. It seemed to be a little low, for, after staggering for a second, she went off like an engine into the bamboo. We followed her up, and found her lying in wait in thick scrub with three or four others. Suddenly the bamboo parted like grass, and out she rushed like a torpedo, charging right home. Lord Lovat waited steadily till within five yards, and gave her a good one almost exactly on her forehead over the juncture of the trunk. This swung her round as quick as a teetotum, and I, standing close by, got a shot into her as she turned. This considerably diminished her ardour, and after getting away about

DABUS RIVER.

200 yards, we found her very sick, standing motionless, and Lord Lovat gave her the *coup de grâce*.

The next day I left for the standing camp, it being imperative to get supplies sufficient to carry us right to Famaka, the country in front having been absolutely laid waste, and the people reduced to semi-starvation by the two Abyssinian expeditions of last year and this. Such a clearance had been made of the resources of the people that a regular caravan had to be organized to scour the country for ten days to get enough wheat and sheep, etc., for our caravan, and an estimated ten to fourteen days' march and halts. In the interim, finding from the head of the Abyssinian frontier police, as I may call them, that the Blue Nile, or Abai as the Abyssinians call it, was at no great distance and a

good elephant country, I made an excursion there, and in barely five and a half hours' marching reached the Gumbi ridge, which bounds the horizon on the east from our camp, and found to my astonishment the valley of the Abai at my feet, and the silver sheet of water not 6 miles off. According to the maps, this point of the Abai would be nearly 70 miles from the camp at Mendi; and I think the error arose from conjecturing the course by the lie of the distant mountains, which, however, are very much to the north of the river, and attributing this stretch of the river to the lower reach of the Didesa. The latter flows into the Nile at the range called the Chochi, some 20 miles further south than its junction as placed in the maps. In ancient maps of the Portuguese (1620), the Angar is rightly put, but the Didesa is apparently taken to be the White Nile. The blank in maps of Abyssinia south of the Blue Nile is due to the fact that Gojam, with this river at its south boundary, extends some 20 miles further south at its south-westerly bend.

From here I joined the caravan, a day's march on the Abderrahman road, and, after a long march of nearly nine hours, camped on the bank of the Dabus. The next day we crossed this fine river, 200 yards wide and 3 feet deep at the ford, and next evening were joined by Lord Lovat, who had had splendid sport with elephant, and had killed seven—four in one day. He found the natives of great assistance, a race probably of the Berta tribe of Shankallas, a typical ground race as contrasted with the migrant and conquering tribes of Gallas and Somalis, deeply versed in field and forest lore, with a name for every tree and plant and bird. He witnessed a most interesting case of their finding honey by the honey-bird. This bird came into the camp uttering a peculiar note. The natives recognized it at once, and prepared to start in the most business-like way to follow the bird. They were brought straight to a tree, which they promptly proceeded to divest of an immense bees' nest, and extract the honey. The Abyssinians were much impressed with this performance (they are very fond of honey), and when the bird made its appearance again, were evidently on the alert to imitate the natives, and followed it. The difference in note and movement, however, was immediately detected by the Shankallas, who took no notice of it, and, needless to say, the Abyssinians could make nothing of the business.

The land descends to the Dabus from the Mendi plateau, and tapers away to the north in three ranges, Gumbi, Chochi, and Gonfi, the district Barke on the north side of the Dabus belonging to the level of the Blue Nile, and is practically the extreme edge of the great Nile basin. Three days' march from the Dabus, through a country seared in all directions by the fires of the invaders, brought us to Abderrahman, the capital. Abderrahman Ibn Khugli, the ruler of the country, had joined Damisi in his expedition to the south, and the ruling family was

represented by his son, a child of five or six, who, with his uncle, came down in state, surrounded by a guard of variously-tinted negroes to pay us a formal visit. We entertained him with an exhibition of white rats that ran by clockwork, and a most engaging cat that, when wound up, wagged his head as he walked, and bleated like a lamb. I am bound to say that the elders of the government were as delighted as the child, and the toys were accepted as a gift, and are now, no doubt, added to the national treasury.

The name Beni Shongul* does not occur in the accounts of early travellers. The principal stock belongs to the Berta tribe, whose range is from the Blue Nile to the Bambishi mountains in the south, and Dabus on the east. Their ruling families were probably of the Fung race, who migrated north on the destruction of the Nubian power at Dongola in 1504, driving the Arabs before them, and collided with the Abyssinians under Socinius in 1610–12. They are an offshoot of the negro races of the Nile basin, though through mixture with Arab and Galla blood, they are now easily distinguished by their lighter and smaller frames and less distinctly negro features. Every gradation, however, exists from the almost pure negro to the half-bred Arab or Galla, and there is the same variety of religion, language, and weapons. Two curious weapons are characteristic of this race—a throwing-stick, or boomerang (called trumbash), of exactly the same shape as those represented in hunting-scenes in Egyptian monuments; and an ugly looking sickle-shaped knife with a prong sticking out of the middle of the curved blade, forming a two-pointed and bladed scimitar 2 feet 6 inches long. Caillaud was the first to enter this northern point of the country, which he did in company with the expedition under Ismail in 1821. Fazokl was under a Melik called Hassan, a Fung, whose family pedigree Caillaud gives for over 200 years. He submitted to Egyptian arms, and was made to pay tribute of 1000 okas of gold and 2000 male slaves. Ismail's covetousness was much excited by reports of gold, and Caillaud gives an entertaining description of his dismay and disgust at the results of some digging which seemed to have been so contemptibly paltry compared to what his Oriental imagination had led him to anticipate. Just before the Dervish rise to power in 1881 to 1882, this tract was governed by an Egyptian Mamur at Fazokl, under whom were three hereditary sheiks, viz. at Beni Shongul, Gomasha, and Kehli. Their tribute amounted to 1500 okas of gold, or £6000 a year. In 1887 the Dervishes entered the country under Khalil Hosami, but the people would have no dealings with them, and refused them supplies. They retired, but again appeared in force under Abderrasul Omar in 1889, but were again driven back by the head of the Khugli family, called Tur el Guri.

* Beni Shongul = sons of Shankala in an Arabic plural form.

The country through which we passed may be described as an alluvial plain, the strong black soil of basalt denudation lying in the lower ground, but exposing great tracts of grey trachyte in higher levels. The ground is broken by isolated outliers of broken basalt masses that raise their backs like great spines on the otherwise monotonous landscape. For some distance from the Dabus, we had still the thick woods of Gardenia, but after leaving Abderrahman we approached the scenery of the Blue Nile. After crossing the Tumat, we struggled over deep cotton soil and dense jungle, till we descended to the river valley, where the branching dom palm, nourished by subterranean waters, defines the windings of the Nile to beyond Rosaires.

On May 6, we crossed the Blue Nile, here 250 yards wide, and joined hands with the Commandant of Famaka and his detachment of gallant 10th Sudanese, which had distinguished itself at the desperate fight with Ahmed Fedil, near Rosaires. Dearth of transport kept us here for a few days, but, gradually collecting camels and donkeys, we moved down in two detachments to Rosaires along the north bank of the river, for the most part through thick wood and jungle, amidst which the gigantic *Adansonia*, Baobab trees, raised their weird gourd-like arms like the conventional trees of a Christmas pantomime. From Rosaires a gunboat took us to Senaar, and from there to Khartum we descended in a native sailing-boat, a nugger—a sailing-boat, however, that only sails up stream, and is really a drifting raft going down, the movement slightly accelerated by men working a pair of huge clumsy sweeps, two men to an oar. The result was that we were eight days slowly crawling down, scarcely beating the current, cooped up under an awning about 8 feet square at 110° in the shade, with suffocating nights from Senaar to Omdurman, a distance of almost 200 miles. On June 1 we passed under the façade of the rapidly growing governor's palace among the palm trees at Khartum, and that night we lodged in the Khalifa's house, I sleeping in his state "bedroom with bathroom attached."

The spoils of our expedition, besides geographical and geological exploration, were eighteen different kinds of antelopes, ten elephants, and two lions.

The bird collecting, which Lord Lovat took charge of with untiring energy, assisted in the skinning by Mr. Harwood, was rewarded by the result described as follows by Mr. Sclater, F.R.S., in his annual address to the Ornithological Club, November 22, 1899: "Their bird collection contains 520 specimens, representing 299 species, of which eleven are new; examples of many of the species described by Rüppell, and known only by the types in the Frankfurt Museum, are also among the number. A special point of interest in this collection is the number of birds previously only known from eastern and equatorial Africa, which have now been found in Southern Abyssinia. This extremely interesting

collection is now being worked out by Mr. O. Grant." The whole collection has been presented to the British Museum.

It is always of interest to endeavour to forecast the destiny of a new country, and, without risking the dangers that beset a prophet, we may fairly take stock of the field laid open to future enterprise by the destruction of Mahdism. We have here, for no less than 10 degrees of latitude, an immense range of country, whose products are among the most valuable on earth—cotton, coffee, tobacco, and iron, copper, and gold, with a healthy climate, and above all an industrious population, with nothing wanted but greater inducements and improved communication to be brought within the circle of British commercial enterprise, and developed to the highest degree of prosperity.

The Cape to Cairo railway has generally been associated in the mind with the course of the Nile, but it is gradually being realized that this, in a great tract of country between lat. 6° and 10°, is not much better than an immense reservoir, and can scarcely be reckoned as even a waterway. The railway and telegraph will both have to leave the great catchment basin of the Nile, and tap the resources of the whole western side of Abyssinia to the Atbara. If we compare these frontier lands with the Sudan proper, I do not think it would be too much to say that there is more hope of prosperity and trade development immediately outside the Sudan than in it. The climate, soil, population, the capabilities of that great rich region of Galla land that has lately fallen under the dominion of Abyssinia, will some day prove a great accession, not only to the wealth of Abyssinia, but to bordering countries. We may safely say that an era has opened that gives hopes of a fairer destiny than has ever been the lot of these harassed regions in the stormy past, but we may add that the essential condition is a good and settled government, and that this is synonymous with friendly relations between the two powers, Great Britain and Abyssinia. In King Menelik we have as a neighbour a far-seeing and enlightened ruler, whose consolidated and extended empire we should regard with a perfectly friendly eye, so long as under his guidance it continues to advance along the path of peaceful progress and development.

Before the reading of the paper, Colonel Sir THOMAS HOLDICH (Vice-President) said: It will be a relief to us all to-night, I think, to turn our thoughts for a brief space from Southern Africa to Northern Africa. To-night we have to follow the footsteps of Mr. Weld Blundell and his companions through the most interesting regions of Southern Abyssinia. Of the political importance of Abyssinia, situated as it is between the Somali country and the Red sea on the one side, and the Nile valley on the other, it is not necessary to speak; but I am quite sure a more intimate acquaintance with the geography of the country, and a better understanding of the manners and customs of its interesting inhabitants, will lead us to form sounder conclusions as to what ancient Ethiopia should be to us, than we can otherwise obtain.

After the reading of the paper, Dr. KOETTLITZ gave a summary of the geological observations, which is printed in the Appendix.

Dr. BOWDLER SHARPE: At this late hour of the evening, when we have had a sort of supplementary paper from Dr. Koettlitz, I will merely say that probably this expedition of Mr. Weld Blundell and Lord Lovat will rank in the history of zoology as an extraordinary feat in expeditions. A most unfortunate occurrence deprived them of the bulk of their cartridges, but you have heard from Mr. Blundell to-night that we have had five hundred specimens of birds alone, in my department of the museum, on which Mr. Ogilvie Grant has written a paper. These specimens were collected during a journey which was adventurous in the highest degree, and besides that there were the difficulties of transport and the collecting of specimens. Three hundred different species of birds were collected and are represented by these five hundred specimens. When one knows that they were short of cartridges, and that they had to examine every bird with their field-glasses before they shot it, to make sure that it wasn't already in the collection, it is really a most wonderful exploit. I believe such a thing has never been done before in the history of zoology. If you have any number of cartridges of course you can collect all round, but when you go with the intention, as Mr. Weld Blundell and Lord Lovat did, to bring back as much as possible, and find yourself very short of ammunition, there is nothing more difficult than to make a splendid collection, as they have done. The great interest to us is that since Sir Cornwallis Harris, no Englishman has penetrated into Shoa. His collection went first to the Indian Museum, and then came to the British Museum, and our specimens through India, are very old and were mounted in the old-fashioned way and exposed to the sun and dust for many years, becoming very dilapidated indeed. The travellers have generously presented to the British Museum this beautiful collection, so that we now have representatives of numbers of species of birds unknown to English naturalists, the only other representatives being in the museum at Frankfort, collected by Rüppell in the early part of the century. In addition there are fifteen new species that have not been seen before, and it is interesting that, starting as they do in Somaliland, they carry the Somaliland fauna a certain distance into Eastern Abyssinia and the borderland of Shoa. It is interesting to compare this collection with that of Mr. Lort Phillips, made during his expedition into Somaliland. Perhaps one of the most interesting facts is that in this country there is a certain East African element; there are specimens of birds we have never seen before, but which have been discovered in German East Africa, so that when Mr. Grant has finished his account, I am sure we shall find there are relations between the ornithology of this corner of Eastern and North-Eastern Africa which we had not suspected before. I have only to say that it is very nice to be able to congratulate an English expedition on having done such good work in the cause of science, and it is a pity that, with all the energy our Government shows in different directions, it never does what the French and Germans do, *i.e.* appoint a naturalist in every country they explore. If it was not for the energy of our private subjects, like Mr. Weld Blundell, Sir Harry Johnston, Mr. F. J. Jackson, and Mr. Lort Phillips, we should be far behind in the race for scientific knowledge and discovery, in Africa at least. To point the truth of what I say, I may add that when Uganda was pacified and the "Pax Britannica" reigned there, the first person to take advantage of it was the German naturalist Oscar Neumann, and the first result of Mr. Blundell's good relations with Abyssinia is for Mr. Neumann again to follow in his steps. Why the English Government cannot do what private individuals and public-spirited societies of England do, is a mystery I shall never be able to solve while I am an Englishman.

Sir THOMAS HOLDICH: I have first of all to ask you to accord a welcome to a very distinguished traveller, who has returned amongst us from a far country—Captain Deasy. For months past we have only dimly heard of the excellent work he has been doing in a remote corner of the world, the south-west corner of Kashgar or the Chinese "New Dominion." Next we have to deplore the absence of our President on this occasion. When the expedition to Magdala was undertaken in 1868, Mr. (now Sir) Clements Markham was appointed to accompany it as historian and geographer, and it is from his excellent book on the subject that we know as much as we do about the physiography of the northern parts, which seem to differ in no very essential degree from what Mr. Weld Blundell has told us about the southern. To me the most interesting feature about Abyssinia is the existence there of a Christian community, which has lasted so much longer in high Africa than any other similar community in high Asia; where such communities disappeared before Mohammedanism. I believe the Abyssinians date their Christianity from the teachings of that eunuch of Queen Candace, of whose conversion we read in the Bible. Historical evidence places it about the beginning of the fourth century. However that may be, it is certainly a Christianity which recognizes symbols and forms and ceremonies very much more than the ordinary practices of the Christian religion. One symbol in particular, I remember, is the exhibition of something blue as an indication of a bond of religious affinity; this claims an Abyssinian's friendship and regard as to a brother Christian. The origin of this I have never been able to discover, but I observed in those very quaint pictures which decorate their churches, which are either caricatures of Byzantine works of very ancient date, or else, as I am inclined to think, of Portuguese works of later date, they carefully preserve the blue colour for the robe of the Madonna—exactly in the same way as you will see in the mediæval art of the old masters. I believe Colonel Conder also mentions, in one of his books on Syria, blue as a recognized symbol of Christianity amongst the communities there. No one, however, has been able to tell me what the origin may be. I asked my learned friend Sir Henry Yule about it, and he was unable to tell me exactly when it originated.*

Of the Abyssinian's regard for observances I had an uncomfortable proof on one occasion when surveying the upper sources of the Atbara during the Abyssinian expedition. I happened to light one day on the same camping-ground as the well-known Tigre chief Yessus, who had made himself objectionable in many ways. I was so little inclined to take up my position alongside him, that I began to make tracks elsewhere; when he sent a deputation to remind me that next day was Easter Sunday, and asked me to join him in celebrating it. I thought I had better not refuse the invitation, and I attended. It was the crudest and rudest sort of banquet at which I have ever assisted. In the centre of a big red tent we sat on the ground to eat raw meat and drink raw "tej," and my host got uncomfortably tipsy. I had misgivings as to how things would end, so I had stationed a guard outside to assist me out of difficulties, if necessary. Next day I meditated a return

* At the conclusion of the lecture, it was pointed out to me by Mr. Levi, a learned Oriental scholar, that blue was the national and religious colour symbol of the Hebrews (*vide* Numb. xv. 38, 39), and that in all probability it was borrowed from them by the Abyssinians or Ethiopians in very early days. As the colour representing the feminine principle in nature, it is at least as old as the myth of Venus rising from the sea, and in heraldry blue is denoted by horizontal lines representing the sea. Yet the colour symbol of the prototype of Venus (the goddess Ishtar) of the early Chaldæans appears to have been pale yellow.—TH. H.

call to say "thank you" for the entertainment of the day before, but my host had left, and in an absent-minded manner he had taken all my transport with him.

I must ask you to join with me in rendering thanks to Mr. Blundell for his admirable lecture, which has interested us exceedingly.

(*To be continued.*)

HUDSON'S VOYAGE TO SPITSBERGEN IN 1607.*

By SIR MARTIN CONWAY.

THE most puzzling of all the accounts of early voyages to Spitsbergen is that which describes Hudson's voyage of 1607. The fault was probably not Hudson's, for he is known to have been an accurate observer, but John Playse's. Playse (or Pleyce) was one of the ship's company, who kept a journal and seems to have copied into it extracts from Hudson's log. It is clear, however, that he either misunderstood what Hudson wrote, or altered it in the copying, for the purpose of claiming new discoveries beyond those made by Barents in 1596, as well as the attainment of a far higher latitude than was actually reached. In support of this contention I now proceed to analyze Playse's account, as printed by Purchas (vol. iii. p. 567), and reprinted by the Hakluyt Society in 1860 ('Henry Hudson the Navigator,' edited by G. M. Asher, pp. 1–22).

On May 1, 1607, the *Hopewell*, eighty tons, with Henry Hudson for master, John Colman mate, William Collins boatswain, and a crew of eight men and a boy, weighed anchor at Gravesend and sailed for the northern seas. After spending some time on the coast of Greenland, they sailed eastward for Spitsbergen, of whose discovery by Barents they were aware, and by whose chart they apparently directed their course. The claim that they independently rediscovered the island cannot be sustained. On June 27 (p. 8), "about one or two of the clocke in the morning, we made Newland [*i.e.* Spitsbergen], being cleere weather on the sea; but the land was covered with fogge, the ice lying very thick all along the shore for 15 or 16 leagues, which we saw. Having faire wind, we coasted it in a very pleasing smooth sea, and had no ground at an hundred fathoms foure leagues from the shoare. This day at noone, wee accounted we were in 78 degrees [*i.e.* near the mouth of Ice fiord], and we stood along the shoare. This day was so foggie, that we were hardly able to see the land many times, but by our account we were neare Vogel Hooke [the north end of Prince Charles foreland, lat.

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* Not 1608, as misprinted on Hondius' chart of 1611 in Pontanus, and often elsewhere in the early literature of polar exploration.

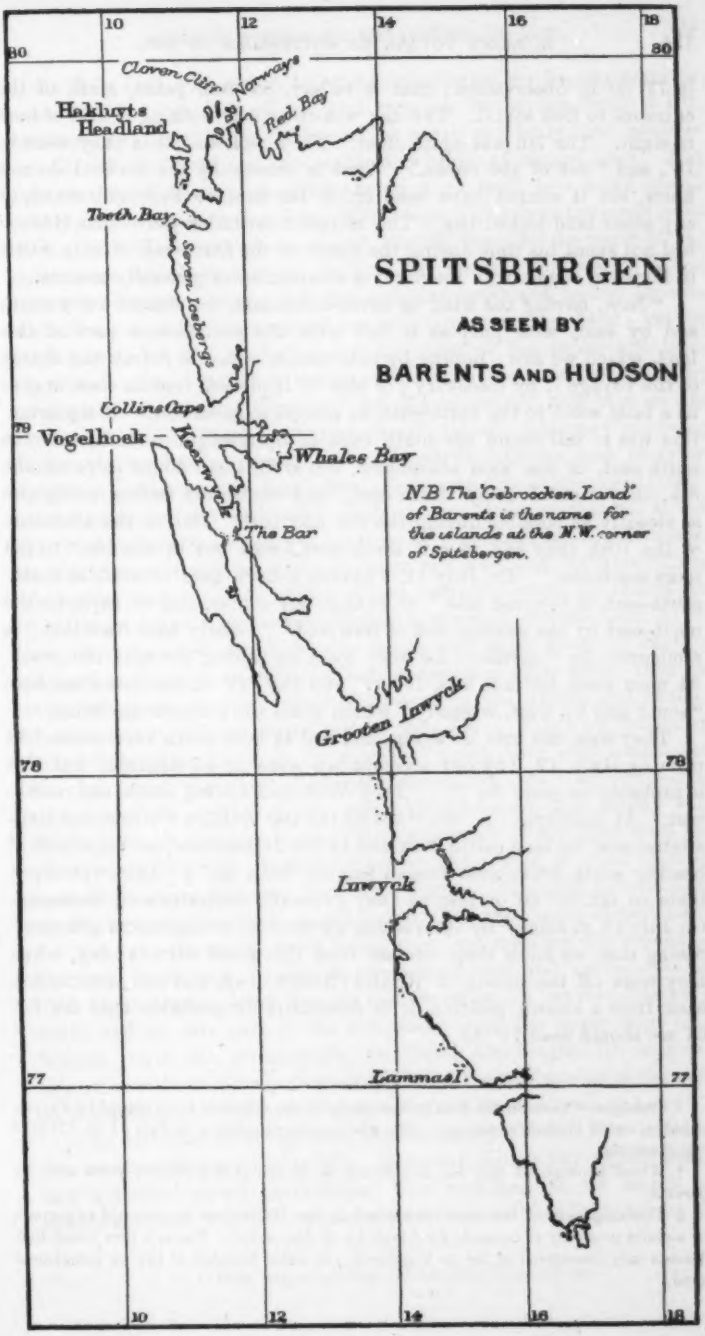
79°]. About eight of the clocke this eevening, we purposed to shape our course from thence north-west."

They tried to get away from the land, but the ice drove them back. About midnight after the 28th they were west and in sight of Vogel Hook. On July 1 at noon (p. 10), "wee were embayed with ice, lying between the land and us. By our observation we were in 78 degrees 42 minutes, whereby we accounted we were thwart of the great Indraught." The "great Indraught" is the "Grooten Inwyck" of Barents, the modern Ice fiord. The latitude of its mouth on Barents' chart is 78°, which is approximately correct. If they were in 78° 42′, they must have been off Cape Sietoe of Prince Charles' foreland. "To free ourselves of the ice, we steered between the south-east and south, and to the westward, as we could have sea [*i.e.* they could not have been making rapid progress; yet] about six this evening it pleased God to give us cleere weather, and we found we were shot farre into the inlet, being almost a bay, and environed with very high mountains, with low land betweene them; wee had no ground in this bay at an hundred fathoms." The description of the bay and the depth suggests that they were inside Ice fjord, 90 miles sailing from their position at noon, which is impossible. If the position was fairly correct, as is probable, they must merely have been somewhat east of the south point of Prince Charles Foreland, but certainly not up Foreland sound.

The log continues, "Being sure where we were, we steered away west [the natural course if they were off the mouth of Ice fiord, but an impossible course if they were in Foreland sound], the wind at south, east and calme, and found all our ice on the northern shore, and a cleare sea to the southward."

On July 2, "the wind at north-east, a faire gale with cleere weather, the ice being to the northward off us, and the weather shore [*i.e.* land being to the northward], and an open sea to the southwards under our lee," they were outside the mouth of Ice fiord, but not yet clear of the south extremity of Prince Charles Foreland. They sailed 10 leagues to the north-west, and at noon, by observation, they were in lat. 78° 56′, *i.e.* nearly off Vogel Hook again. On the third (at noon?) they were, by observation, in lat. 78° 33′, *i.e.* off the middle of Prince Charles foreland. "This day wee had our shrouds frozen; it was searching cold; we also trended the ice, not knowing whether we were cleare or not, the wind being at north. The *fourth* was very cold, and our shrouds and sayles frozen; we found we were farre in the inlet." They accordingly stood south-south-east, south, and south-west by west, which seems to prove that they must have been at the southern entrance to Foreland sound, up which the tide may have carried them in the fog. Such courses would not have taken them out of Ice fiord.

At twelve on July 5, "we strooke a hull, having brought ourselves neare the mouth of the inlet." On July 6 they were in the open sea,


10
12
14
16
18
80
Cloven Cliff
Norways
Hakluyts Headland
Red Bay
Teeth Bay
Seven Icebergs
SPITSBERGEN
AS SEEN BY
BARENTS AND HUDSON
Collins Cape
79
Vogelhoak
Hoorwyck
Whales Bay
N.B The 'Gebroocken Land' of Barents is the name for the islands at the N.W. corner of Spitsbergen.
The Bar
Grooten Lawyck
78
Lawyck
77
Lammas I.

in 77° 30′ by observation; that is to say, off Bell point, south of the entrance to Bell sound. The day was clear, but nothing is said of land in sight. The 7th was again clear. They reckoned that they were in 78°, and "out of the Sacke." What is meant by the Sacke I do not know, but it cannot have been either Ice fiord, or Foreland sound, or any other land-locked bay. The recorded latitudes prove that Hudson had not spent his time during the whole of the first week of July either in Foreland sound or in Ice fiord, as commentators generally assume.

"Now, having the wind at north-north-east, we steered away south and by east, with purpose to fall with the southermost part of this land, which we saw; hoping by this meane, either to defray the charge of the voyage [? by discovery], or else, if it pleased God in time to give us a faire wind to the north-east, to satisfie expectation." If the intention was to sail round the south cape of Spitsbergen and then to the north-east, it was soon abandoned, for, after some hours' calm on the 8th, they "stood away north-east," and continued sailing north-east as steadily as possible during the 9th and 10th. But in the afternoon of the 10th they had to sail south-south-west out of the ice "to get more sea-roome." On July 11, "having a fresh gale of wind at south-south-east, it behoved mee * to change my course, and to sayle to the north-east by the souther end of Newland." Clearly here "souther" is a misprint for "norther," for they went on sailing towards the north. At noon their latitude was 79° 17′, and the sun on the meridian bore "south and by west, westerly," which gives the compass deviation.

They soon ran into ice again, and had to turn south once more. At noon on July 12, "by our accompt we were in 80 degrees," but this is probably an error for 79°. They continued sailing north and north-east. At midnight (p. 13), "out of the top William Collins, our boat-swaine, saw the land called Newland by the Hollanders [*i.e.* Vogelhook],† bearing south-south-west twelve leagues from us."‡ This would put them in lat. 79° 30′ or less, as they generally overestimated distances. On July 13, at noon, "by observation we were in 80 degrees 23 minutes." Seeing that we know their courses from this point till next day, when they were off the mouth of Whales [King's] bay, and can thus reckon back from a known position, it is demonstrably probable that for 80° 23′ we should read 79° 23′.

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* Passages written in the first person singular are assumed to be copied by Playse, *verbatim*, out of Hudson's own log. The whole passage relating to July 11 (p. 12) is of this character.

† Which throughout this log is assumed to be the most northerly point seen by Barents.

‡ This emphasis on the land discovered by the Hollanders is intended to prepare for a claim presently to be made for "land by us discovered," Playse's idea being that Barents only discovered as far as Vogelhook—an utter blunder, if not an intentional fraud.

On July 14th, "at noone, being a thicke fogge, we found ourselves neere land, bearing east off us; and running farther we found a bay [Whales bay] open to the west and by north northerly, the bottome and sides thereof being to our sight very high and ragged land. The norther side of this bayes mouth, being high land, is a small island [really a mountain cape, Scoresby's Mitre cape, which from the south looks like an island], the which we called Collins Cape, by the name of our boatswaine, who first saw it. In this bay we saw many whales, and one of our company having a hooke and line overboord to trie for fish, a whale came under the keele of our ship and made her held; yet by God's mercie we had no harme, but the losse of the hooke and three parts of the line. At a south-west sunne from the north-west and by north, a flood set into the bay. At the mouth of this bay we had sounding thirtie fathoms, and after six and twentie fathoms; but being farther in, we had no ground at an hundred fathoms, and therefore judged it rather a sound then a bay. Betweene this high ragged [land], in the swampes and vallies lay much snow. Heere wee found it hot. On the souther side of this bay lye three or four small islands or rockes.* In the bottom of this bay, John Colman, my mate, and William Collins, my boatswaine, with two others of our company, went on shoare, and there they found and brought aboord a payre of morses teeth in the jaw; they likewise found whales bones, and some dosen or more of deeres hornes; they saw the footings of beasts of other sorts; they also saw rote-geese; they saw much driftwood on the shoare, and found a streame or two of fresh water. Here they found it hot on the shoare, and drank water to coole their thirst, which they also commended Here we found the want of a better ship-boate. As they certified me, they were not on the shoare past half an houre, and among other things brought aboord a stone of the countrey. When they went from us it was calme, but presently after we had a gale of wind at north-east, which came with the flood with fogge. We plyed too and againe in the bay, waiting their coming; but after they came aboord we had the wind at east and by south a fine gale; we minding our voyage, and the time to perform it, steered away north-east and north-north-east. This night proved cleere, and we had the sunne on the meridian, on the north and by east part of the compasse; from the upper edge of the horizon, with the crosse-staffe, we found his height 10 degrees 40 minutes, without allowing any thing for the semidiameter of the sunne, or the distance off the end of the staffe from the center in the eye."

The latitude, therefore, was approximately 79° 5′. The latitude of the mouth of King's bay is 79°. Moreover, King's bay agrees with the bay described in all particulars. The sounding at its mouth is 27 fathoms, whilst within there are 250 fathoms. Near its southern shore

* Here begins another extract from Hudson's log.

are four or five small islands or rocks, near Coal haven. Hudson named it Whales bay, as we gather from a later entry (p. 20) in Playse's log, where he says (July 27), "we found the want of a good ship-boate, as once we had done before at Whales bay." The name was used in 1611 in the Moscovy Company's instructions to Thomas Edge, who was ordered to take his ship to Whales bay, and there fish for whales, and who sailed accordingly to King's bay.

In the morning of July 15 "was very cleere weather, the sunne shining warme, but little wind at east southerly. By a south-east sunne we had brought Collins cape to beare off us south-east, and we saw the high land of Newland, that part by us discovered on our starboard, eight or ten leagues from us trending north-east and by east [really north magnetic; their bearings are frequently very wrong], and south-west and by west, eighteene or twentie leagues from us to the north-east, being a very high mountaynous land, like ragged rockes with snow betweene them [the so-called Seven Icebergs, a good description]. By mine account the norther part of this land which now we saw stretched into 81 degrees." The furthest point they could possibly have seen was Hakluyt's headland, which Edge records to have been named by Hudson on this voyage, but that is only in lat. 79° 49′. Probably they did not at this moment see further than the point south of the entrance to Magdalena bay. The claim to have discovered the land north of Collins cape is as unfounded as was their claim to have reached a very high latitude.

In the morning of July 16 the weather was warm and clear. "Being runne toward the farthest part of the land by us discovered [*i.e.* to Hakluyt's headland], which for the most part trendeth nearest hand north-east and south-west [really north and south], wee saw more land joyning to the same, trending north [really east] in our sight, by meanes of the clearnesse of the weather, stretching farre in 82 degrees and by the bowing or shewing of the sky much farther."

There is a serious blunder here. Having reached Hakluyt's headland, they mistook the easterly trending north coast for a northward extension of the west coast, and so added on longitude to latitude. Believing, or pretending to believe, that Hakluyt's headland was in 81°, instead of 79° 49′, they then concluded that the land they saw stretched on northward (instead of eastward) into 82° and further. "Which when I first saw," continues Playse, now clearly quoting from Hudson, "I hoped to have had a free sea between the land and the ice and meant to have compassed this land by the north [*i.e.* to have sailed along the north coast]. But now, finding by proofe it was impossible by means of the abundance of ice compassing us about by the north and joyning to the land, and seeing God did blesse us with a faire wind to sayle by the south of this land [*i.e.* round the South cape] to the north-east, we returned, bearing up the helme, minding to hold that

part of the land which the Hollanders had discovered [*i.e.* Prince Charles foreland and the coast below Ice fiord] in our sight; and if contrary winds should take us, to harbour there, and to trie what we could finde to the charge of our voyage, and to proceed on our discoverie as soone as God should blesse us with winde. . . . I think this land may bee profitable to those that will adventure it. In this bay before spoken of [Whales bay], and about this coast, we saw more abundance of seales than we had seene any time before, swimming in the water. At noone this day, having a stiffe gale of wind at north, we were thwart of Collins cape, standing in 81 degrees and a halfe."

Seeing that on the previous page (p. 15) he had recorded a very correct observation which gave 79° 5′ as the latitude of Collins cape, it is evident that there must have been some jockeying of the figures here; but upon whom the responsibility should lie for the falsification it is now impossible to say. It is, at all events, certain that the most northerly point reached by Hudson was Hakluyt's headland, and that, the year being very icy and the pack fast down on the north coast of Spitsbergen, he was unable to proceed thence to the eastward as Barents had done.

From noon on July 16, and throughout the 17th, 18th, and 19th, they proceeded southward. At eight o'clock in the morning of the 20th "wee saw land ahead of us under our lee, and to weatherward of us, distant from us 12 leagues, being part of Newland. It is very high mountainous land; the highest that we had seene untill now [an incorrect observation]. As we sayled neere it, we saw a sound [Bell sound] ahead of us, lying east and west. . . . From eight till noone was calme. This day, by observation, we were in 77 degrees 26 minutes [the mouth of Bell sound is 77° 40′]. On the norther side of the mouth of this inlet lie three ilands [really blocks of mountains divided by valleys, which would look like islands from the distance (10 leagues) they were from land], not farre the one from the other, being very high mountainous land. The farthest of the three to the north-west [*i.e.* the block of the sea-front just south of the entrance to Ice fiord] hath four very high mounts [Mount Starashchin], like heapes of corne. That iland next the inlets mouth, hath one very high mount on the souther end [true!]. Here one of our companie killed a red-billed bird."

They were still in sight of land on the 23rd and 25th, but then they sailed away west towards Greenland, meaning, as he afterwards states (p. 20), quoting from Hudson, "to have made my returne by the north of Greenland to Davis his Streights, and so for England," if there had been a passage, which of course there was not. So he sailed back westward, and on July 30 saw some part of Spitsbergen again.

"In the evening, we saw an iland bearing off us north-west [? N.E.] from us 5 leagues, and we saw land bearing off from us 7 leagues. We had land likewise bearing off us from east-south-east to south-east and

by east as we judged 10 leagues." The name Lammas island marked on Hondius' map, which professes to embody Hudson's discoveries, probably refers to this island, though Lammas-day is not July 30, but August 1. What they saw was not an island but a mountain, for there is no island in the south of Spitsbergen that can be seen 5 leagues away—certainly not the Dun islands, which correspond in latitude with the Lammas island of the map. It is highly probable that they were off the mouth of Horn sound, and that the island was Rotchesfell. Sailing on slowly south, they accounted that at midnight they were in lat. 76°. This must be a misprint for 77°, which agrees with their probable position. The parallel 76° runs nearly 30 miles clear south of the South Cape. The land, 10 leagues distant, "was the likeliest land that wee had seene on all parts of Newland, being playne riggie land of a meane height and not ragged, as all the rest was that we had seene this voyage, nor covered with snow." Probably this refers to the low hills and large flats that flank the coast for about 10 miles south of Horn sound. Early on August 1 they were thwart of Bear island. "In ranging homewards," says Thomas Edge in Purchas (iii. p. 464), Hudson "discovered an island [Jan Mayen island] lying in seventy-one degrees, which he named Hudson's Tutches." On September 15 the *Hopewell* "arrived in Tilberie Hope in the Thames." Thus ended a voyage to which, as far as Spitsbergen at any rate is concerned, more historical importance has been attached than it deserved. No new land was discovered and no very high latitude attained. Its one important result was the discovery of the number of whales frequenting Whales bay. A comparison between Playse's log and that of Barents' companion Gerrit De Veer demonstrates the great superiority of the Dutchmen's work, both as explorers and as recorders of what they discovered.

Maps.

There are only two maps which throw any light upon Hudson's voyage of 1607. The portions of both which include Spitsbergen are here reproduced. The first is Barents' own map, engraved in 1598, and published in 1599 by Cornelius Claesz, in the second part of the abridged Latin edition of Linschoten's Itinerarium. The second is the north polar chart published by Jodocus Hondius in 1611, in Pontanus' 'History of Amsterdam.'

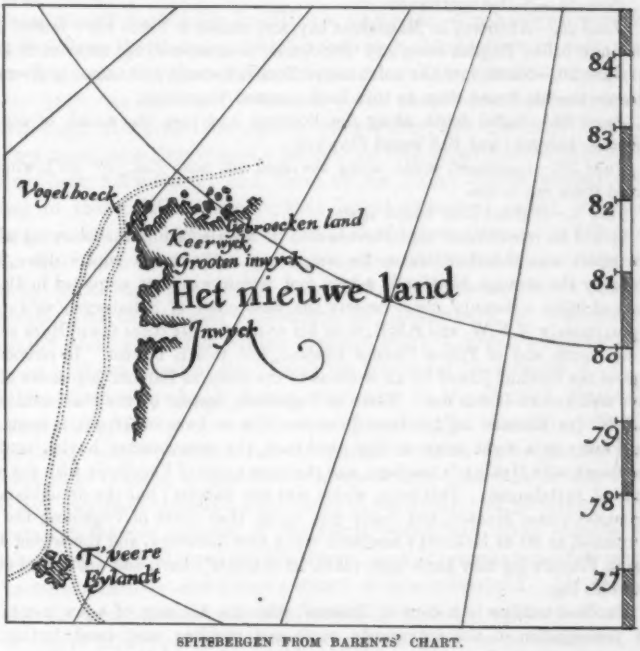
Hondius' map is nothing more than a copy of Barents' with Hudson's new names introduced (Collins cape being misspelt Colnis), and with the outline of the ice-pack likewise quite incorrect, labelled *Glacies ab H. Hudsono detecta ann.* 1608 (for 1607). As far, therefore, as the outline of the land is concerned, we have only to consider Barents' map and its relation to his discoveries.

Barents' discoveries in 1596 were as follows:—

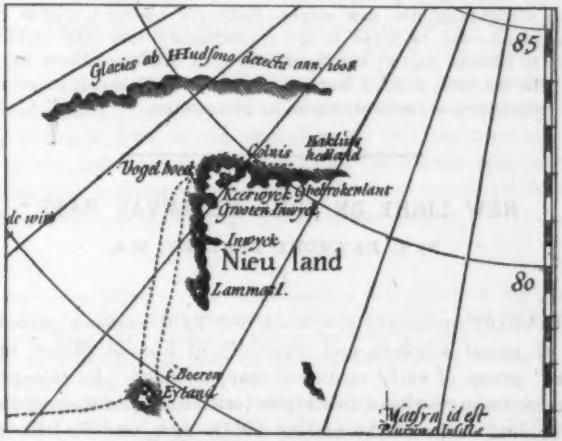
June 13.—Sailed from Bear island, keeping well to the west, out of sight of land or in fog.

June 17.—Lat. 80° 10′; steering S.S.W., sighted north coast of Spitsbergen, which was visible approximately from the mouth of Liefde bay to Hakluyt's headland; they sailed west along it.

June 20.—Twenty miles N.N.E. of Hakluyt's headland at noon; sailed to mouth of Red bay.



SPITSBERGEN FROM BARENTS' CHART.



SPITSBERGEN FROM HONDIUS' CHART.

June 21.—Anchored west of Cloven cliff.

June 22.—Explored Fair haven and discovered the Norway islands.

June 23.—Rounded Hakluyt's headland, observed the west coast trending S. ½ E., and returned to anchorage.

June 24.—Sailed southward.

June 25.—Anchored in Magdelena bay, and named it Teeth bay; landed at the cove now called English cove, and took formal possession in the name of Holland.

June 26.—Sailed into the north end of Foreland sound, and named it Keerwyck, because the bar forced them to turn back; named Vogelhoek.

June 28.—Sailed south along the Foreland and past the mouth of Ice fiord (Grooten Inwyck) and Bell sound (Inwyck).

June 29.—Continued south along the land till noon (lat. 76° 50′), when ice forced them out to sea.

July 1.—Sighted Bear island again.

It will be remembered that Barents died in Novaja Zemlja the following winter. His chart was therefore drawn for engraving without his supervision; hence probably the strange blunder it set on foot which was first corrected in Daniel's chart of 1612. Barents' chart depicts the west coast of Spitsbergen as running approximately N.N.W. and S.S.E. from his southernmost point (near Horn sound) to the north end of Prince Charles foreland, and this is correct. It erroneously depicts the foreland joined by an isthmus to the main, as Barents' log shows him to have well known it was not. North of Vogelhoek, instead of the coast continuing N. ½ W. (as Barents' log for June 23 shows him to have observed), it is made to bend away at a right angle to the north-east, the draughtsman having confused Vogelhoek with Hakluyt's headland, and the coast north of Vogelhoek with the north coast of Spitsbergen. This error, which was not Barents', but the draughtsman's, perhaps confused Hudson, and made him think that north of Vogelhoek the land he trended as far as Hakluyt's headland was a new discovery, and the wrong bearings in Playse's log may have been taken off Barents' chart, and not copied out of Hudson's log.

Hondius' outline is a copy of Barents', with the addition of a few names and the prolongation of the erroneously north-east trending west coast further and yet more erroneously to the north-east. If the form of the coast is corrected by being straightened, the new names—Hakluyt's headland, Collins cape, and Lammas island—will be found to fall approximately into their right positions relatively to Barents' names; but the *Glacies ab H. Hudsono detecta*, i.e. the edge of the polar ice-pack, which I have shown was in 1607 fast down on the north coast of Spitsbergen, is hopelessly out of its true position.

NEW LIGHT ON SOME MEDIÆVAL MAPS.

By C. RAYMOND BEAZLEY, M.A.

II.

We have briefly considered how much new light has been gained by the labour of recent scholars, and especially of Konrad Miller, upon the "Beatus" group of early mediæval mappemondes. In this paper we may examine the results of this higher criticism upon some of the other cartographical works of the earlier middle ages, and for this purpose we may take here the "Cotton" or "Anglo-Saxon" map of the tenth century, the map of "Henry of Mainz" of the early twelfth century,

the "Jerome" maps of the same age, and the "Psalter" of the thirteenth century.

These are all dealt with in Miller's 'Ältesten Weltkarten,' part iii. ('Die kleineren Weltkarten,' 1895); and on a comparison of this most recent treatment with that of Santarem in the 'Essai sur Cosmographie' of 1849–1852, we can readily see how great an advance has been made. For although the great Portuguese geographer, like Joachim Lelewel, rendered invaluable services as a pioneer in this department of historical inquiry, both his writings and those of his Polish fellow-worker were lacking in that critical acumen, that laboriousness of detail, and that synthetic power which has characterized the highest German and French scholarship of our time. The work of Bevan and Phillot shows a distinct advance, in its account of the maps here in question, upon that of Santarem; but the studies of Jomard, of Cortembert, of Walleser, of Philippi,* and of Konrad Miller himself, mark a great advance even upon the high standard of the 'Essay on Mediæval Geography.'†

I. The Cotton or Anglo-Saxon map, now in the British Museum,‡ and measuring 21·2 by 17·6 centimètres, is among the most interesting of all mediæval world-pictures, and it supplies us with a design far more accurate than is usual in the cartography of this time. It is also more extensive and more detailed than most of its rivals; it pourtrays with comparative fulness regions of the Earth which are often outside the knowledge of the mediæval draughtsman; and it records not a few places and natural features elsewhere omitted or misunderstood. Its delineation of the coast-line of the continents and their separate countries shows a very different hand from that which gave us, for instance, the Ashburnham-Valcavado of 970. In fact, there is hardly any map of the middle age, before the beginning of the Portolani, which can sustain a comparison in the matter of contour § with the "Cottoniana." In its general shape, the *οἰκουμένη*, or Habitable World, is here represented as square, and in this it recalls some of the most debased examples of the "Beatus group." But in the execution of this right-angled design there is all the difference between the gross and narrow ignorance of an uncompromising symmetry, and a certain far from contemptible, though not highly developed, knowledge and scientific insight.

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* Cf. especially, Philippi, 'Zur Rekonstruktion d. Weltkarte d. Agrippa,' 1880; Walleser, 'Die Welt-Tafel des Ravennaten,' 1894; Cortembert, 'Trois des plus anciens monuments de Géog.,' 1877; Jomard, 'Monuments de Géog.,' 1862.

† 'The Hereford Map: an Essay on Mediæval Geography.' By the Rev. W. L. Bevan and the Rev. H. W. Phillot. 1877.

‡ Cotton MSS., Tiberius B.V. Its colouring is *green* for the ocean and most seas, but *red* for the Persian and Arabian gulfs, and for the whole course of the Nile with its lakes; *vivid green* for the mountains.

§ I refer here to the general contour of the great land masses, not to that of separate countries, in which, *e.g.*, Matthew Paris, for England, is much superior.

As far as we can see, the Cottoniana does not belong to any one of the ascertainable families of mediæval maps. It is far removed from all the members of the Beatus class; it is equally far removed from the school to which Henry of Mainz, the Psalter, the Hereford, and the Ebstorf maps (with the addition of the related Jerome designs) belong. Nor has it any relation with the various types of zone- or climate-map which we know under the names of Macrobius-, Sallust-, or T-O—sketches. A certain relationship, at least in the excellence of contour, may be descried between the Cottoniana and the Matthew Paris maps of the thirteenth century, especially in the form and content of the British Isles. But this is not the detailed and conscious relationship of works really in touch with one another, as model and copy; but the unconscious and general likeness of different periods of high-class cartographical work. Matthew Paris, moreover, has all the advantage of his period. He lived in one of the most flourishing and highly developed of the mediæval eras, whereas the Cotton map comes upon us as a surprise from one of the gloomiest of the dark ages. Some have pushed back the date of our present example to the ninth century and the time of King Alfred; it is more probably of about a century later; and Prof. Miller, with his usual constructive skill, has suggested that it belongs to the time of Archbishop Siric or Sigeric, of Canterbury (990–994). The map itself occurs in a manuscript of the Latin 'Periegesis' of Priscian (based upon the Greek original of Dionysius), but its content is in no special agreement with the work it professedly illustrates. It is, indeed, far more closely related to Orosius; it has also some relationship with Pomponius Mela, St. Isidore of Seville, and the geographical writings and plans of St. Jerome; finally, it bears clear marks of a later time, the time of the northern invasions at the end of the first Christian millennium. Thus the correspondences with Adam of Bremen (who died circ. 1076) afford at least a probability that the Cottoniana in certain places drew material from the same original as the great northern annalist; while some of the names in the British Isles, in Gaul, and in the far East and North-East thoroughly bear out the tenth-century date, which most scholars are now inclined to accept.

The resemblances which have been noticed, or fancied, between the Cottoniana and the designs of the Beatus group, and also between the present work and the writings of Julius Honorius, are but shadowy at the best; on the other hand, there is undoubtedly a use of scriptural matter in this design. It would be strange if it were otherwise; for every specimen of the earlier cartography of the Christian Middle Age naturally, and as a matter of course, shows the influence of the Jewish and Christian scriptures. Some have questioned the tenth-century date, now usually assigned to the Cottoniana, on the ground of its being too good for the time; but, though it is unquestionably the best in contour of all the earlier mediæval

mappemondes, yet certain parts of other works, equally emanating from the dark-age time, show a comparative accuracy which proves that even at the worst periods it was possible to give a respectable sketch of some land-outlines. As to the abundant and valuable material of this map, no one has a right to argue therefrom against the tenth-century

THE COTTON OR ANGLO-SAXON MAP RESTORED.

claim. For, as we see from the map of St. Sever (circ. 1030), a work of even greater elaboration, though of less scientific character, was produced by the generation immediately after Sigeric; and we have already learnt from the Beatus family that the goodness of a map is by no means an absolute matter of date; on the contrary, it depends not a little upon the copyist or draughtsman himself and his immediate original.

The comparative excellence of the Cottoniana is perhaps due to its being the work of an Irish scholar-monk. We are all well aware that in pre-Norman "England" and "Britain" (*i.e.* in the British isles between the age of Justinian and the age of William the Conqueror) there is no school of learning, of art, of religion, of literature, or of science, comparable to that which sprang from the Irish Church of Patrick, Colomba, and Aidan. The insertion of Irish names,* especially that of Armagh, on our present map strengthens the view that it is the work of a scholar who was trained in Irish schools, or derived his knowledge from men so trained.

Among the sources of the Cottoniana, as we have already said, the most important is Orosius. Out of a hundred and forty-six legends, seventy-five are derived from the writings of St. Augustine's favourite disciple; and in these seventy-five we find the textual basis of the whole map, and the names of almost all the countries enumerated thereon. Prof. Miller argues ingeniously, from various details, that this Orosian material appears to be derived more directly from the lost Orosian map than from the existing text of the geographical passages in the *Historiæ adversus Paganos*. In any case, the work here in question shows us a certain, though small, body of antique material other than that existing in the Orosian writings, as at present known. The scribe or draughtsman tells us that he found, in the manuscript of Priscian's 'Periegesis,' a map which he thought was drawn by Priscian himself. This map he supposed to have been meant by Priscian as an illustration of his treatise, originally a translation from the third-century Greek of Dionysius;† but it is plausibly conjectured by Miller to have been a copy of the lost Orosian scheme; and, in any case, it was obviously the immediate original of the Cottoniana. Thus the latter design, unique among its contemporaries, and therefore mysterious, in its cartographical merit, is brought into a certain relation with an ancient geographical school of no contemptible attainment; and in this case, as in others, we find a law of evolution, of inter-connection, and of historical development, bringing together the most surprising and distant parallels, and throwing light upon a field where, as in natural science, the mistaken ideas of separate and unconnected existence had long prevailed.

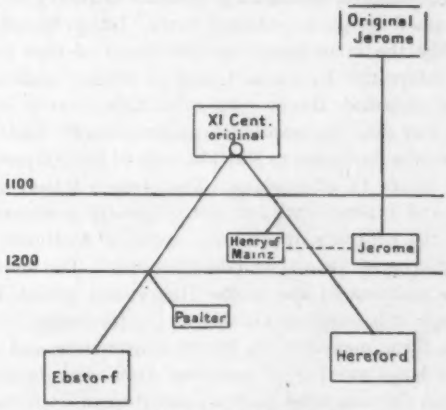
The connection with Mela appears in the general idea of the Oikoumenê, or Habitable World, as an oblong (tending to square), and in the delineation of various outlines, rather than in the detailed legends

* A very unusual feature in the earliest mediæval maps of continental origin. This Irish theory is not inconsistent with the suggested Sigeric connection. The Cottoniana may have been draughted by an Irish scholar in the archbishop's household.

† Also paraphrased in Latin by Rufus Festus Avienus (at the end of the fourth century) in his 'Descriptio Orbis Terræ.'

and place-names. Some of the non-Orosian data of the Cotton map may be derived from Jerome, though they may, for the most part, be explained, and perhaps better explained, directly from the Bible. But the treatment of the Twelve Tribes in this map certainly suggests a reference to the lost plan of the great Latin doctor illustrating this subject.

With St. Isidore there are several peculiar coincidences,* mostly of a classical type; and with Adam of Bremen others, equally striking, of a much later character. Here the mention of the Turks and the Bulgars, of Iceland and the Slavs, together with that of the "South Britons" of North-West Gaul, points us, like the handwriting of the map itself, to an era not very distant from the year 1000. With Julius Honorius, and with the anonymous geographer of Ravenna, there is slight, but curiously definite, connection in a few place-names;† and the same may



PEDIGREE OF THE HEREFORD MAP.

be said of the correspondences between the Cottoniana and the works of the Beatus family. A Roman province-map was probably the source of the divisions so clearly marked in Asia Minor, in Central and South-Eastern Europe, and in North Africa. Lastly, the biblical relationships of the Cotton design may be traced, not only in many names, but in a good part of what we may call the general design. It is obvious that our present scheme was not merely indebted to the Scriptures for details such as almost all mediæval maps exhibit, but was to a large extent drawn for a special Biblical lesson. Just as the mappemonde of Beatus had for its radical purpose (in part at least) a delineation of the Twelve Apostles, their dioceses, and their distribution over the Oikoumené as

* *E.g.* the "abundant lions" in the extreme north-east of Asia.

† Cf. The *Bulgari*, *Salerno*, *Verona*, *Tarsus*, *Hypanis*, etc.

"sowers of the Word through the field of this World," so the Cottoniana, probably based on a lost design of Paulus Orosius, had for one of its main objects a picture of the settlement of the Twelve Tribes of Israel.

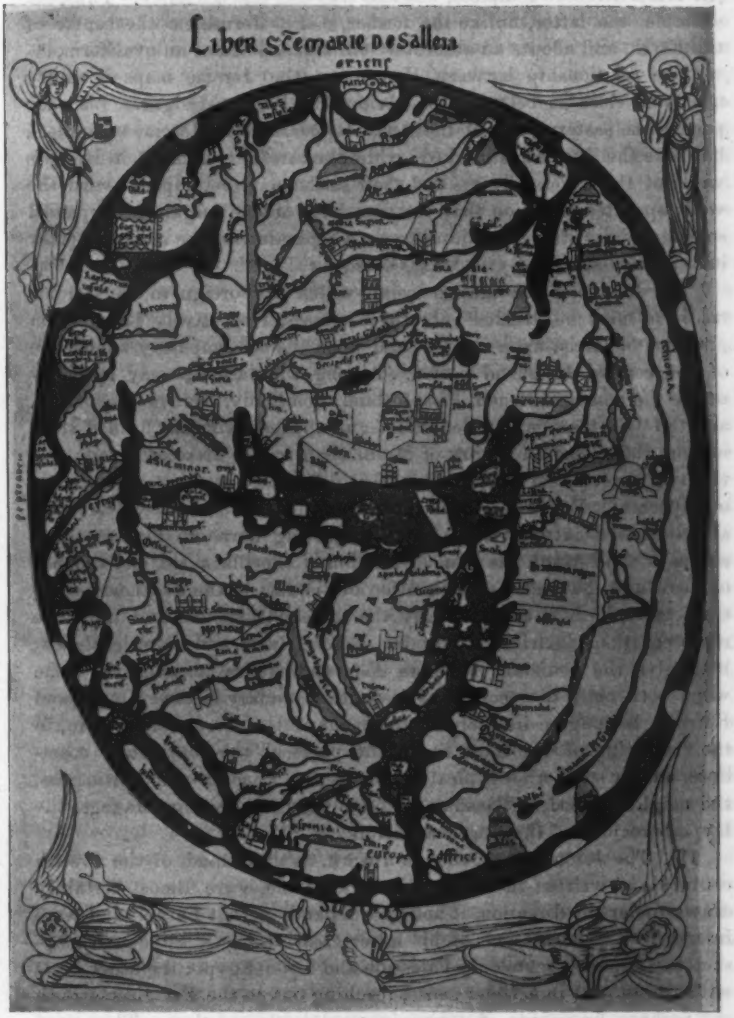
II. The map of Henry of Mainz (circ. 1110) belongs apparently, like the Psalter map of later date (circ. 1230), to another group or family of cartographical works, which may be compared with the more closely-knit members of the Beatus genealogy. To the present stock may be also assigned, as the younger brothers of "Henry" and the "Psalter" respectively, the "Hereford" and "Ebstorf" examples of the closing thirteenth century—huge wall-pictures which represented (in size though not in execution), more faithfully than their older relatives, the probable eleventh-century original. Lastly, the Jerome maps (of about 1150) are connected with this same group, not by common descent, but by conscious intercourse, through the medium of Henry of Mainz.

The last-named design is contained in the 'Imago Mundi' of a certain Henry, probably the same person as the Canon of that name, who in 1111 appears before the Episcopal Court of Mainz; possibly he is the same as the Archbishop Henry who ruled this Church between 1142 and 1152. In any case the map accompanies a work which was written about 1110 and was dedicated to Matilda, wife of the Emperor Henry V., and mother of Henry II. of England. The 'Imago Mundi' here referred to was copied and interpolated, but not originally composed, by Henry of Mainz; on the contrary, it was the work of a slightly older contemporary, Honorius of Autun (who died in 1140). The map, however, is apparently the addition of the scribe Henry, and is not derived from Honorius, though it is based on another and older design.

It is oval in form, measures 29½ by 20½ centimetres, and contains 229 legends, with a large number of unnamed cities, mountains, and rivers, whose titles can for the most part be ascertained with the aid of the other members of this cartographical family—the Psalter, Ebstorf, Hereford, and the Jerome plans. Though the present world-scheme professedly illustrates the 'Imago' copied by Henry, the relationship between the two is not close. As in the case of the Cotton map and the text of Priscian which it accompanies, the peculiarities of the chart are not in the manuscript, nor are those of the manuscript represented in the map. On the other hand, the Mainz design is obviously in relation with the Hereford, as an elder with a younger brother; and the relationship of these two works may be traced in almost every part of the world, and in nearly every important feature of the draughtsmanship. At the same time, the greater size of the Hereford enables it to admit a far larger content; and this superior mass of material is still more shown on the Ebstorf; while the tiny Psalter is naturally more limited, though far more crowded, than the Mainz copy.* In

* 229 legends on Henry of Mainz; 1021 on Hereford; 1224 on Ebstorf; 145 on Psalter.

particular, the larger examples (Hereford and Ebstorf) contain more * matter of classical origin than the smaller ones (Henry and the Psalter);



THE MAP OF HENRY OF MAINZ.

but all these works alike may be fairly supposed to spring from a common

* *I.e.* a greater bulk of classical matter; as we shall see, in some respects the Psalter shows itself more classical in spirit than any other of this family.

original—a great wall-map, as already suggested, of the eleventh century. Of this original, Henry's transcript is more accurate, but more limited; the Hereford more complete, but less true and less scholarly. Thus, for example, the latter, unlike the former, makes Jerusalem the centre of the Earth, and adopts an absolutely circular instead of an oval form.

The relationship between Henry and the Jerome maps is pretty nearly as close as between the Mainz and Psalter designs. We only possess the eastern parts of the *Orbis Antiquus* in the Jerome examples; but here the likeness is marked; while the careful treatment, in Henry's work, of the Twelve Tribes and their settlements corresponds with the well-supported tradition that the translator of the Vulgate, who passed so many years in Syria, did compose a separate treatise and map (now lost) on this subject.*

The details in the Mainz design which are foreign to the Jerome tradition may be divided into three classes, respectively based upon Æthicus of Istria, upon Solinus, and upon the contemporary knowledge of the central Mediæval period. Among the last we may specially notice the names of Rouen, Pisa, Iceland, Lombardy, Noreya or Norway, and the "German" and "Venetian" gulfs. The peninsular form of Italy is more developed in Henry of Mainz than in the Hereford map; but the two agree in so many points that differences such as this become unimportant. Both maps have the same widening of the Mediterranean at its eastern extremity, the same projecting horns to represent the angles of the Levant, the same elongation of the Black sea and the Sea of Azov, and the same approximation of the last to the Northern ocean. Once more, both have practically the same Nile-system and the same representation of African mountains, Asiatic rivers, and Oceanic islands; both give the boundary between Asia and Africa in much the same way; both omit to specify any definite boundary between Asia and Europe; both agree in their arrangement of the surrounding ocean, in their drawing of the most important parts of the continental coast-lines, and in such other typical details as the Caspian and Baltic seas, the neighbourhood of Paradise, and the lands of the Gog-Magogs, the Hyperboreans, and the Dog-headed folk.

III. The Jerome maps, though a work, as they stand, of the twelfth century and written in the script of that time, were almost certainly drawn under the direction, if not by the hand, of that Father, and were intended to illustrate one of his lesser treatises.† Of these two map-sketches, one represents only Palestine and lower Egypt; the other deals with the Levant in a wider sense, reaching out to the Far East. Both are perhaps fragments of a more general work, now lost. They were evidently designed in colour, but this has only partly been executed.

* Cf. the Cotton map just noticed in illustration of this 'Divisio Filiorum Israel' in cartography.

† 'De situ et nominibus locorum Hebraicorum.'

As they stand, they are of about A.D. 1150, and measure respectively 35·5 by 35·8 centimetres and 23·6 by 22·4 centimetres. They are in a uniform hand of late Romanesque character, and cover the whole leaf of the manuscript without any margin. Certain almost invisible marks show, for one thing, that the scribe wrote rough copies of various names as if to get his hand in for the fair draught; and for another, that the larger map was probably a section, and a section only, of a mappemonde or complete sketch of the Oikoumenê. St. Jerome himself, in another place,* declares how he translated Eusebius' description of the land of Judah, and his enumeration of the chief places and natural features mentioned in Scripture. This geographical work of the famous Church historian was apparently composed soon after A.D. 324; and his description of Judæa, according to Jerome, was illustrated by a "picture," or plan, of Jerusalem and the temple. Eusebius also seems to have drawn a genealogic tree, or scheme, showing the division of the Twelve Tribes,† and this scheme was soon after embodied on a mappemonde, which had probably a good deal of influence on mediæval cartography.

Among others, the historian Bæda, in his work, 'On the Place-names in the Acts of the Apostles,' shows an intellectual relationship with the Jerome maps so close (both as to insertions and omissions) as to support the belief that he knew and used these works. In the content of the same, we may notice that there is only one entry—and that may well be an interpolation—which refers to a time distinctly later than St. Jerome's. The identification of Bulgaria and Mœsia brings us down to the latter part of the seventh century, when (about A.D. 678) the Bulgar emigration from the Middle Volga was first definitely settled in this region. On the other hand, the grouping of Crete with the Cyclades, as the Seventh Province of the Greeks, squares with the imperial arrangements of the fourth century. Again, the identification of Emmaus and Nikopolis is a confusion which is exactly reproduced in another passage of St. Jerome's works. Once more, the distribution of the Roman provinces of the Levant (as shown on these maps) for the most part agrees closely with the known position of affairs at the end of the fourth century. Lastly, the Jerome plans are lacking in matter of a purely mediæval type; in other words, are emphatically pre-mediæval. The Earthly Paradise is not marked, nor the world centre at Jerusalem. Moreover, the richness and abundance of ancient geographical detail,‡ untouched by later legend, point to an origin not later than the fourth century after Christ.

In examining this detail it is clear we have on one hand scriptural, on the other hand quite general, material. Jerome's original purpose was evident to depict Biblical localities, just as Beatus started with a purpose of illustrating the distribution, preaching, and chief

* Preface to 'Liber de Locis.' † Have we here one original of the Cotton map?
‡ *E.g.* 278 legends in the larger map, 195 in the smaller; 66 being common to both.

centres of the various apostles, or as the Sallust and Macrobius plans originated in the desire of explaining certain passages in those authors. This Biblical map-work of Jerome's was closely connected with the 'Onomasticon' of Eusebius, which in many ways serves the purpose of an accompanying text; but of course the scope of Jerome's larger design is wider than the range of this work of Eusebius.* Even in the smaller, the sectional Palestine-and-Egypt, map there is a difference. For whereas the Onomasticon had left out some of the larger Syrian towns and enumerated many insignificant ones, St. Jerome's sketch supplies us with nearly all the capitals and omits some of the hamlets.

The non-Biblical content of the Jerome maps belongs to the oldest type of post-Ptolemaic mappemonde. The later classical school, especially as represented by Pliny and Solinus, has evidently much influence on these works, whose use of Plinian material is closely parallel to the employment of the same by the author of the 'Collectanea.' As Konrad Miller has also suggested, it seems probable that the draughtsman of the present examples has made some use of a Roman road-map, similar to the Peutinger Table, in which the imperial provinces were marked, with two of the leading towns in each.

IV. The "Psalter" map of the British Museum is the last example we need take here of the school or family of cartography which also includes Henry of Mainz, Ebstorf, and Hereford, and is related collaterally to the Jerome designs. In this case the work in question has been so often and so carefully described that a brief notice of the most recent criticism will suffice. Its connection with other works is not entirely unsuspected by Bevan and Phillot, by the British Museum map catalogue, by Santarem, and by the older school of geographical scholars; but Prof. Miller, here as elsewhere, has made clear advances on earlier study. No one could fail to notice the resemblance of the Psalter—as a wheel map, which specializes on monstrous races—with the Hereford and Ebstorf of similar characteristics. But Miller has been the first to show that the newly rediscovered † map of Ebstorf is an even closer relative of the Psalter than that of Hereford; and that the present design is more antique in character, though not in the mere *amount* of derived material, than any other of this family. In other words, it bears a more immediate relationship to the common original than Henry of Mainz, Hereford, or Ebstorf. Especially this would appear to be true of the contour and general delineation; the argument from the text of the legends and other written matter on the map, though it supports this conclusion, is weakened by the obviously weak scholarship of the draughtsman. Outside its own family, the Psalter has some points of agreement both with Beatus and with Lambert of St. Omer. Of modern names it gives us several of some interest.

The following points have been noticed by various scholars, not

* 'Onomasticon de locis hebraicis.' † First noticed by Wömpner, 1833.

without occasional exaggeration: First, the extreme smallness of the design, which is a circle with a diameter of only $8\frac{1}{2}$ centimetres. Secondly, the abundant and crowded content, supplying no less than 145 legends and inscriptions. Thirdly, the semi-mythical and dark-age character of the work in general, removed as far as any from the comparative science (though not from the nomenclature) of the ancient world, and almost untouched by the new light of the Mediæval Renaissance. Fourthly, the similarity of the map itself with the Hereford example, and of its ornamental border with the rim ornament of the latter. Prof. Miller has pointed out, however, that the Psalter ornament in question is Romanesque in feeling, while that of the Hereford is pure Gothic; that in the Psalter's enumeration of the great winds a severely classical nomenclature is used; that the mountain ramparts forming the prison of the Gog-Magogs, with the Gates of Alexander, in North-East Asia, are unusually developed; and that Paradise is detailed, with the sacred rivers (here *five* in number) not quite in agreement with other designs of this type.

The chief work of the latest study of this map has certainly been to demonstrate its close connection with the Ebstorf example, beyond all other parallels. This is to be traced not only in the Gog-Magog region and in the zone of monsters that runs along the southern shore of Africa, but also in the nearness of East Africa to West India, in the form of the Mediterranean, and in the unnatural abridgment of the three peninsulas of Southern Europe. Along with the larger Jerome map of the Levant, the Psalter helps us to fill up the gap which occurs in the Far East of the Ebstorf. The trees of the Sun and Moon in the present example are very important marks of the geographical mythology of this time; whether they are, or are not, perversions of the older story of the Eastern pillars of Alexander balancing the Western pillars of Hercules. The chief additional references to what may be called the fact and fiction of the central Mediæval period do not lie in the monsters of South Africa (as some have supposed), for these are almost purely Solinian. They are rather to be found in the mention of Damietta, of the Ruscitæ or Russians,* of the Olcus or Volga, of the land of the Western Slavs, of Ala or Halle, and of two later names in the British Isles, viz. Wales and Scotland.

Lastly, we may compare this map, as an illustration of a Psalter, or manuscript of the Book of Psalms, with the plan of Beatus, at least in this —that both originate in the ornamentation or illustration of a certain portion of Scripture; of the Hebrew poetry in one case, of the Apocalypse in the other. Illustrated Psalters are very ancient; the British Museum alone possesses one of about A.D. 700; and the Albi map of the eighth century, which occurs in a manuscript of Glosses on the Gospels, furnishes another parallel to this Biblical cartography.

* Cf. the *Ruzzia* of Adam of Bremen.

A MAP OF ST. KILDA.*

By J. NORMAN HEATHCOTE.

When I first contemplated making a map of St. Kilda, I was under the impression that it would be an easy place to survey, but I have since come to the conclusion that it is not the best sort of country for a tyro in cartography to commence upon. The absence of level ground makes the measurement of a base-line a matter of considerable difficulty, and the precipitous nature of the cliffs renders an accurate delineation of the coast-line practically impossible. With the exception of Village bay, there is no point where it is possible to reach the sea-level from above without a more or less difficult climb, and many parts of the coast cannot even be seen from a height without some peril to life and limb. The alternative of mapping the shore from a boat is made more troublesome by the never-ceasing swell. I twice rowed round the outside of Soay, an expedition taking some five or six hours, and on both occasions the swell was so heavy that it was dangerous to come near the rocks in many places, and the tossing of the boat added materially to the difficulty of drawing. Probably an old hand at surveying, with luck, might take all necessary observations in a fortnight, but what with delays caused by wind, rain, and mist, which sometimes hung about the hills without intermission for a week or ten days, and what with loss of time in learning the idiosyncrasies of the theodolite, and mistakes due to ignorance or carelessness, I found that I had to work pretty hard to get everything done in two months.

My first idea was to measure a base-line on the sandy shore in Village bay, but as the sand is covered at high tide, the station points had to be placed among the large boulders above high-water mark. This made it difficult to make an accurate measurement, and as I found that there were comparatively few points of importance visible from both ends, I practically only used this base to determine a few heights, and made the map from a base on Mullach Sgail. Here there is a large expanse of nearly level ground, and by measuring two sides of a triangle and the angles, I was able to get a base-line of 700 yards, one station point overlooking Village bay, the other commanding the glen. I measured this twice with a steel tape, made the correction for difference of altitude, and took angles with the theodolite to cairns which I had erected on the top of Connacher and Oisaval from all three points of the triangle. My principal station points were on Connacher, Oisaval, Ruadhval, Mullach Bith, Mullach Mor, Cop a's àirde, and Cambargh; but I also took angles from several other places, so as to be able to fix the principal points all round the coast.

As landing is always a risky business owing to the incessant swell, and the ascent of Soay or Boreray entails a difficult climb, I did not attempt to get the theodolite ashore on those islands, but took angles to all

* Map, p. 204.

conspicuous points on Boreray from Connacher, Cambargh, and Oisaval, and in the case of Soay, from Cambargh, Mullach Bith, and from a point between the two. Then by calculating the distances from both bases, *i.e.* Connacher to Cambargh, and Connacher to Oisaval, and finding that the results agreed near enough for practical purposes, I considered that I should get the shape of the islands with sufficient accuracy by sketching in the other sides from notes, sketches, and photographs taken on land and from a boat.

With regard to altitudes, I took double readings of the vertical angles from all the station points, and in the case of the main points worked out the height from the calculated distance, but in some cases depended on the measured distance on the map. I used the first base on the shore to ascertain the height of the station point on Mullach Sgail, and for the peaks of Dun, and tested them by measuring very accurately a base entirely on the sand when the tide was low. Finding that my estimate of the height of Connacher did not agree with the Admiralty chart, I was careful to test it in every possible way, but as in every case my results came about the same, I feel confident that my estimate is not far wrong. The natives were not actually hostile to my surveying efforts, except that I occasionally found a cairn pulled down; but they thought there was something uncanny about a theodolite, and never seemed particularly anxious to give me any assistance.

As might be expected in an island so remote, they are a primitive people, with simple habits, charming manners, and no vices; but I am afraid the march of civilization is tending to demoralize them. Visitors in yachts, and tourists, who go in considerable numbers every summer in steamers, have always given them presents. Well-meaning people from the south have sent boats, furniture, fishing-tackle, and all sorts of things at various times, and the result is that they distrust strangers and try to get as much out of them as possible. They look upon presents as a right, and are beginning to think that not only need they not pay rent, but that meal, potatoes, and other necessaries of life should be supplied by MacLeod of MacLeod, the landlord, without payment. Until recently, they were quite ignorant of the value of money, and even now all transactions with the landlord are carried out by barter. One has to break through this crust of antagonism to find out their good qualities. To people they know and like they are charming, pleasant companions, anxious to please, perfectly honest, and not at all grasping. Their houses are not always models of cleanliness, but they are clean in their persons, absolutely sober, and as industrious as most people who are not compelled to work. Their principal occupation is fowling. A fat, oily fulmar petrel is their favourite food, and large numbers of young fulmars and gannets are salted for winter consumption. In the intervals of bird-catching they cultivate a little ground, catch a few fish, and look after their sheep, while in the winter months they weave a considerable quantity of home-spun cloth.

St. Kilda was inhabited at a very early period. There are several underground houses similar to those made by the aborigines of Scotland, and the legend recorded by Martin, of the warrior queen who hunted deer on the land between St. Kilda and Harris, points to the possibility of men having found their way there at a time when the island still formed part of the mainland of Scotland. The present inhabitants are descended from emigrants from Skye or the outer Hebrides early in the last century, when the island was repeopled after being devastated by small-pox. They are seventy in number, but though there has been little or no importation of fresh blood, they show no signs of deterioration caused by in and in breeding. They are a fine, powerful race, sound in mind and body, and the children all look remarkably healthy. There used to be great mortality among newly born babies, but this was due to improper treatment, and the eight-day sickness, as it was called, is no longer known in the island.

THE MASHONALAND RAILWAY SURVEY.*

We have received from Mr. Harry Good the route-plan of the projected Mashonaland railway (reproduced in the present number of the *Journal*), based on a recently completed survey by theodolite and chain. The chain work was commenced from the 222nd mile-peg, which marks the terminus of the Beira railway. This railway, which was originally constructed on the 2-foot gauge, was to be relaid on the gauge of 2 feet 6 inches during the last dry weather. Mr. Good's original map shows the flood openings allowed at the more important waterways to be crossed by the Mashonaland railway, and thus gives an idea of the size of the streams during the rainy season. The largest of these all occur on the first part of the route from Umtali to Salisbury, on which the Odzi and other important branches of the Sabi are crossed. Beyond the Rusapi the route finally adopted deviates from the original line, which coincided roughly with the direction of Selous's road. By skirting the basin of the Sabi to the north, and so running mainly along the watershed between that river and the Zambezi, the crossing of large streams is here avoided.

Mr. Good remarks that the astronomical positions of Umtali and Salisbury have not been determined, but in the case of the former this has lately been done, as mentioned a short time ago in the *Journal*, by signals exchanged with Cape Town, the longitude obtained being 32° 40′ 18″. No doubt that of Salisbury will shortly be fixed by members of the Geodetic Survey; meanwhile the value recently given in a report of the South Africa Company, viz. 30° 49′, may be taken as approximately correct. It should be mentioned that the orientation of the map is not due north and south, Salisbury lying considerably north of Umtali.

* Map, p. 204.

FINLAND AND ITS PEOPLE.

By HUGH ROBERT MILL, D.Sc.

THERE is no country of Europe, or in the world, the statistics of which have been so thoroughly mapped with regard to all features and conditions as Finland. The remarkable Atlas of Finland, a unique epitome of the geography of any large region, has already been noticed in the *Journal* (vol. xiv. p. 692, December, 1899), and the present review is concerned with the volume of text * prepared to accompany the atlas, and issued in three separate editions, Finnish, Swedish, and French, by the Geographical Society in Helsingfors. There are two editions of the atlas, one in French, the other in Finnish and Swedish; but all the work of survey, statistics, discussion, cartography, and printing is Finnish work carried out in Finland, and executed in a manner to excite the admiration, if it cannot arouse the emulation, of the best geographers and map-makers of Britain or Germany. The work, it is pleasing to notice, is a direct result of the exhibition held at the Sixth International Geographical Congress in London in 1895, when the Finnish Geographical Society exhibited a number of maps, many of them specially constructed for that occasion. These were so well received both in London and subsequently in Helsingfors, that the Government of the Grand Duchy assisted the Society by a grant of £520 in completing the work in the form of an atlas, to which this special volume of *Fennia* forms the text. The whole work was under the charge of a committee presided over by Prof. E. R. Neovius, and including J. A. Palmén, M. Alfthan, J. P. Norrlin, E. G. Palmén, O. Savander, and J. J. Sederholm.

Each plate in the atlas is the subject of a separately paged description in the text, forming usually a fairly exhaustive memoir on the subject in question. The reasons for the adoption of the projection are given in full. It is a modified conic projection cutting the sphere along the parallels of 61° 15′ and 64° 45′, with the meridian of Helsingfors as the central line. The scale for the chief maps is 1 : 2,000,000, or about 32 miles to an inch. Taking the country as a whole, over 11 per cent. of the surface is occupied by lakes and rivers, this proportion rising to nearly 25 per cent. for the governments of St. Michel, Kuopio, and Viborg. The eight provinces or governments are divided into 51 bailiwicks, which are subdivided into 269 parishes, each of which is clearly shown on the first map of the atlas. The hypsometric map is fully described; it shows the land rising steadily towards the east and north from a low coastal plain on the west and south, a surface

* 'Atlas de Finlande.' Texte. Publié par la Société de Géographie de Finlande. *Fennia*, vol. xvii. Helsingfors, 1899.

broken by innumerable hills and lake-basins roughly arranged in ridges and furrows running from north-west to south-east. Certain minor ridges running in two rows nearly parallel to the south coast are not very prominent on this map, nor does the map of solid geology throw any light on them; but the drift-map brings them out, in quite a startling manner. Here they are shown to be lines of åsar, or terminal moraines; but it requires the railway map to reveal their true importance as regards lines of communication. The main railway from St. Petersburg to Hangö does not run along the coast so as to pass through Helsingfors, but sweeps inland to the shore of Lake Saima, whence it follows the crest of the åsar almost without interruption, usually sharing the ridge with a high road, for 200 miles to Hangö. This ridge forms a watershed for the most part, but is breached by the larger rivers. The geology is fully described so as to emphasize the remarkable character of the great expanse of ancient sedimentary and igneous rocks worn down to faint relief, and overspread with a sheet of moraine material, edged by a border of washed clays deposited in the Litorina sea. It is curious to notice that the solid geology shows Finland to be one of the most ancient lands on earth, yet the actual configuration of the country is the result of the most recent changes during the glacial and post-glacial periods.

The climate of Finland has been the object of scientific study on the part of the University of Helsingfors since the middle of the eighteenth century, and the Finnish Society of Sciences, and later the Meteorological Institute, have organized a large number of observing-stations. The mean annual temperature of all Finland lies between 36°·5 and 37°·5 Fahr., which is more than 10° higher than the normal temperature for the latitude, the amelioration of climate being most marked in winter. The temperature at all seasons falls from the south-west towards the north-east. During the months of November, December, January, February, and March the mean temperature of the whole country is below the freezing-point, and in the south February is the coldest month. In April, however, the mean temperature in the south is over 36° Fahr., and frost remains only to the north of lat. 64° N. In July, the hottest month, the south-west has a mean temperature exceeding 63° Fahr., practically the same as that of the south of England. The monthly temperature maps are constructed as the average of the ten years 1881–1890; but there are not sufficient data for total precipitation except for the two years 1894 and 1895, which are mapped separately. Much attention has, however, been paid to the snowfall, both with regard to amount and duration. Snow begins to fall in October, but rarely lies until the middle of December, and about Christmas the country is covered to a depth of from 6 inches to a foot. It is the middle of March before the depth of fallen snow comes to a maximum, which averages from 2 feet to 2 feet 6 inches, although over

a large area in the centre of the country it exceeds 3 feet. The thaw comes in April, but it is the end of May before snow vanishes from the north of the Gulf of Bothnia.

The occurrence of night-frosts in summer is the chief anxiety of Finnish farmers, and since 1892 the phenomena have been carefully studied, and the distribution of a selection of the more disastrous cases has been mapped.

The distribution of the native and cultivated plants of Finland has been a matter of long and careful study, and maps are given showing their range. The most general crop is barley, which is cultivated far to the north of the arctic circle, its northern limit being approximately 68° N. Rye is not cultivated quite so far to the north. Oats are grown only to the south-west of a line joining the north of the Gulf of Bothnia and the north of Lake Ladoga, and wheat is only grown in the south-western corner of the land. Potatoes and beet-root are cultivated over the entire country, even in the remotest north.

One of the chief resources of the country is furnished by the extensive forests, which cover practically the whole country outside the farm-clearings, and spread almost unbroken over the north. Most of the woodland in the north of Finland, and a good deal in other parts, belongs to the state and is under strict regulation and supervision. The principal tree of Finland is the Scots pine (*Pinus sylvestris*), and next to it comes the fir (*Picea excelsa*), both trees being found over the whole country. The birch is by far the most important of the deciduous trees, appearing in many varieties, and reduced in size to a mere shrub in the far north. The alder and aspen are also widespread, but the oak is confined to the south of the country.

The habit of burning off forest to obtain land for cultivation is still very widely practised in Finland. More legitimately the forests are used for the preparation of tar, for firewood, and for timber, and of the forest produce 85 per cent. is retained for domestic use or home manufactures, only 15 per cent. being exported. The extent of country under forest amounts to 47 per cent. of the total area, the cultivated land to 10 per cent., the lakes and rivers to 10 per cent., and the waste-lands to 33 per cent.

The population of Finland is treated in great detail, the vital statistics being tabulated for every year since 1750, when the total population was 420,000, down to 1890, when it was 2,380,000. The birth rate, which was 44 per 1000 in 1751, fell to 33 in 1890, the death-rate falling in the same time from 24·6 to 19·6 per thousand. The density of population is greatest in the south-west and south, and diminishes rapidly to the north and east, where considerable areas are practically uninhabited. In the towns two-thirds of the people talked Finnish, and one-third Swedish, but in the country districts eight-ninths of the people were of Finnish speech in 1890. For the whole country 98 per cent. were

Lutherans, and only 1·9 per cent. belonged to the Orthodox Greek (Russian) church. Education is practically universal, but of the whole population of the country only 20 per cent. are able to write, although 98 per cent. are able to read. Notwithstanding the adverse climate, three-quarters of the population are engaged in agriculture. Several articles are devoted to the system of popular education, and maps show the position of all schools of various grades, according to the language of instruction.

Other important articles and maps go into detail as to the relative yield of the various crops in different parts of the country; the amount and nature of the exports and imports; the extent of the railways, roads, telegraph lines, and especially of the almost universal telephones. The mineral resources are discussed and mapped; they consist mainly of iron, much of it in the form of bog ore, although a little copper, tin, and gold are also worked. Various industries are increasing in importance, especially in connection with wood-pulp, wood-working, and ironwork. The want of coal makes water-power specially valuable, and although there are few waterfalls of any height, the rivers of Finland, rushing from lake to lake, form rapids so numerous that we should be tempted to call them innumerable did we not find them all catalogued in the text and indicated on the map by bars across the river, proportional in length to the height of the fall, and circles proportional in size to the available horse-power. This is certainly the most novel and one of the most useful maps, showing that the Finnish people are keenly aware of the importance of neutralizing their want of coal by their abundance of water-power, and anticipating the general use of electricity in industrial work.

The concluding articles and the last maps deal with the prehistoric remains of Finland and the earliest maps of the country, published by Olaus Magnus in 1539, and Andreas Bureus in 1626. The whole gives such a picture of the country as to compel the admiration of every reader for a people who have taken part so bravely in the battle of life in surroundings which are far from encouraging, and who have so carefully ascertained the nature of their country and the extent of its resources. There is here an educated European people of diligent habits and mainly agricultural in calling, struggling successfully with a poor soil and an adverse climate. Such a people, of sound physique and morally superior, would be an acquisition to any country, and if circumstances should compel them to emigrate in large numbers to the congenial climate and more fertile lands of Western Canada, it will be a fortunate circumstance for the Dominion and for the British Empire.

No scenery in different countries has ever struck me as more similar than that of South-Eastern Finland and South-Western Ontario. The rock-bound lakes and open forest of birch and pine, the mossy glades amongst the trees, and even the log-houses have a similarity, which

should greatly soften the breaking of old ties and the transition from the land of the Kalevala to that of the poem whose metre it inspired—"Hiawatha."

MRS. BISHOP'S TRAVELS IN CHINA.*

Mrs. Bishop's latest volume, describing her adventurous journey through Central China in 1896–97, is undoubtedly one of the most important contributions to English literature on that country which have appeared within recent years. Regarded merely as a book of travel, it is fully entitled to rank with such well-known works as the late Captain Gill's 'River of Golden Sand,' while the authoress's high descriptive powers and painstaking determination to obtain an insight into the inner life of the people with whom she comes in contact, render the work particularly valuable for the light it throws both on the country and its inhabitants.

As Mrs. Bishop has already presented the Society with an outline of the events of her journey, it is unnecessary to recapitulate them here. A brief word, however, must be devoted to her descriptions of scenery and other subjects more strictly connected with the geography of the country. Of these her account of her voyage in a native house-boat up the Yang-tse gorges is perhaps the most striking, and, in spite of the many descriptions which have previously appeared, brings home in an unusually vivid manner the characteristics of this part of the great river. Hardly less useful is her detailed account of her journey through Central Se-chuan, which has not been so carefully described by any previous traveller. The agricultural and industrial resources of this important region are fully dealt with. Of special interest, too, is the account of the mountainous region of North-Western Se-chuan, with its aboriginal inhabitants the Miao-tze, where Mrs. Bishop was, at her furthest point, breaking ground never before visited by Europeans.

Describing a day's journey on the threshold of the Miao-tze country, she writes, "I cannot attempt to convey to the reader any idea of the glories and surprises of that long day's journey. It was a perfect extravagance of grandeur of form and beauty of colouring, and the sky approached that of Central Asia in the brilliancy of its bright pure blue. Every outline was sharp, but the gorges were filled with a deep blue or purple atmosphere. . . . Peaks and precipices are piled on each other, and through the rare openings there were gleamings far away of sunlit cones of unsullied snow." A few only of the many instructive studies of Chinese life and character can be touched upon. They deal with such subjects as the New Year festivities and the ceremonies and duties

* 'The Yangtse-Valley and Beyond.' By Mrs. J. F. Bishop. London: Murray. 1899.

connected with them; Chinese charities and educational methods; the system of government and the failings and virtues of the mandarins; and many other questions of importance for the future of the empire. For the Chinese mobs—at whose hands her life was on two occasions in actual danger—Mrs. Bishop has naturally no good word to say; but she found much to like in the dwellers in the country districts, who are generally quiet and harmless. She is far from sharing the views of those who regard the empire in a hopeless state of decay, and, while acknowledging the evils of the system of government, points out various counterbalancing features which tend to the stability of the country. The "open door" policy, as opposed to the political encroachments of European nations, finds in her a vigorous champion. We have said nothing of the many hardships encountered during the journey, but though the writer does not dwell on these, she says enough to make us wonder at the spirit and hardihood which enabled her to persevere in spite of all obstacles, and carry through her undertaking to so successful a termination.

NARRATIVE OF A JOURNEY TO THE LAKES RAKAS-TAL AND MANASAROWAR, IN WESTERN TIBET, UNDERTAKEN IN SEPTEMBER, 1848.*

By Lieut.-General Sir RICHARD STRACHEY, R.E., G.C.S.I., F.R.S.

August 8–16.—Accompanied by my friend Mr. J. E. Winterbottom, I left Almora on August 8, 1848, with the intention of going *viâ* Milam, as far as the Satlaj river in Tibet, and if possible on to the lakes. The first part of the journey presented little that was remarkable, and it was hot and rainy. Our route lay, for about 50 miles, over the outer Himalayan ranges, at elevations between 3000 and 7000 feet, to the valley of the Gori river, at the head of which Milam is situated. Into this valley we descended from the Kalamundi pass, over a ridge rising to over 9000 feet, at the foot of which lies the cluster of villages of which Jalat is the centre and most important. These form the winter residences of the inhabitants of Juhar, the name given to the highest portion of the valley of the Gori, that of the lower part, in which Jalat is situated, being Munshari.

The direct road to Milam lies up the bed of the Gori, but it passes through a gorge between lofty and precipitous mountains, and at this season was impracticable, as bridges, which are each winter destroyed by avalanches, had not yet been repaired. Earlier in the year, when the migration of the people of the highest valleys commences from their winter quarters on the outer ranges, the snow which is accumulated by these avalanches itself affords the means of crossing the river. At the time of our visit the snow had melted, and the Gori was unfordable; we therefore had to take a more circuitous route by the Ralam valley, which joins that of the Gori a little above Jalat.

August 21.—Crossing the Gori, we soon got into dense forest, which became continuous until we left it in ascending the Ralam valley, at an elevation of about 11,000 feet, beyond which arboreous vegetation ceases, and the alpine herbaceous

* As this narrative has not before been published, the information it contains has been considered by the Council of sufficient value to be placed on permanent record.—Ed. *G. J.* Map, p. 204.

zone is entered, which by its wonderful luxuriance characterizes the southern flanks of the snowy ranges at these elevations. In the six days occupied by our journey from Jalat to Milam, upwards of 250 species of flowering plants were added to our collections.

August 23.—Ralam, 12,000 feet, is a wretched-looking village with flat-roofed mud and stone houses, which cut no figure when compared with the far smarter slated abodes of the more civilized inhabitants of Juhar. The people are poor and uncouth, approximating in their habits to the semi-Tibetan population of the contiguous valley of Darma, which is so difficult of access that I was told that no European had entered it since the surveyors in 1817. Ralam is said to be famous for its turnips, but I had no means of testing this.

August 24.—From Ralam our route lay over the Barji-kang pass, 15,400 feet.

Hansa ling, 18,200 feet. Dhánsi, 19,200 feet.

Bed of the Gori, 4000 feet.

VILLAGE OF JALAT, 6400 FEET.

The ascent was easy, and the vegetation abundant and varied, and no fewer than thirteen species of saxifrage were collected between Ralam and the top of the pass. From the summit we looked down into the head of the Gori valley, seeing right up it to the extremity of the great glacier from which that river rises. For a few minutes the peaks of Nanda-devi, 25,700 feet, and Nanda-kot, 22,600 feet, distant about 15 miles to the west, were visible, but they were soon covered by the clouds that constantly hung about the higher points of the snowy mountains during the rainy months. The contrast between the view on the two sides of the pass was most striking. To the north the Milam valley looked bright, cheerful, and dry, chiefly in sunshine, though a few detached clouds threw patches of shadow here and there on the bare brown hillsides; while to the south the Ralam valley was densely filled with mist, which rolled up just over the crest of the pass, but soon dissolved on the dry north face.

August 25.—In the morning, which was wet and cloudy, the temperature of the air was not below 38°·5, but next day, after a clear night, it fell to 32°, and a thermometer exposed to the sky on loose cotton fell to 23°·2. The maximum afternoon temperature was 51°, with the sun shining and the sky tolerably clear.

August 26.—The descent from the pass lay over the faces of the beds of the schists, which dipped steeply to the north-north-east, the uptilted southern ends of which we had crossed during our ascent. The surface was well clothed with the plants common to alpine pastures, such as Potentilla, Ranunculus, Primula, Polygonum, etc., but afforded few new species. With the exception of a dwarf willow (*Salix Lindleyana*), which was found at 14,000 feet, the first woody plant met with was the birch, *Betula utilis* (*Bhojpatra*), which appeared at about 13,500 feet.

The change from the forest-clad mountains and luxuriant vegetation, with the soaking wet and clouds of the outer ranges through which we had come, to the dry and relatively sunny climate of the bare valley of Juhar was very striking, and most acceptable to all of us, and not less so to our herbarium, which, in the constant rain of the last few days, was not improving.

August 27.—We reached Milam, 11,400 feet, on August 27, and it at once became apparent that we had been long enough exposed to the vicissitudes of wet and heat, for almost every one of our servants had been attacked by intermittent fever, some of them rather severely. We fortunately did not suffer.

The highest inhabited part of the valley of the Gori, lying between 10,000 and 12,000 feet above the sea-level, is called Juhar. It is about 10 miles in length, with a bottom breadth of 1 or 2 miles, beyond which the mountains rise steeply, but not very abruptly in their lower portions. The summits of these mountains, for the most part, enter the region of perpetual snow, and most of the larger side ravines are occupied by glaciers. The vegetation is generally scanty, and, with the exception of a few stunted birch, a juniper or two, *Juniperus communis* and *macropoda*, near Milam, and a small cluster of *Pinus excelsa* near Tola, there are, I think, no trees whatever in this part of the valley. The shrubs also are diminutive and confined to a few species, the herbage, where not under the influence of a stream of water, being equally scanty. The flora, however, though poor, is interesting, as containing a very distinct proportion of Tibetan elements, no representatives of which spread into the Gori valley below Juhar. Of these may be mentioned *Caragana pygmæa* (*versicolor*), the commonest of the bushes of the Tibetan uplands, called in Tibetan "trama," but corrupted by the Bhotiyas into "dama." It is a thorny and usually a stunted shrub, which may be compared to our English furze. Other Tibetan forms are *Clematis orientalis*, *Hippophaë rhamnoides*, and species of *Potentilla*, *Lonicera*, and *Pedicularis*.

In the upper part of this valley we come upon the base of the great fossiliferous series of rocks that constitute the mountains forming the ranges on which are situated the principal passes into Tibet. To this line of elevation I have applied the general designation of the *Indian watershed* of the great Tibeto-Himalayan tableland. The occurrence of well-defined series of fossiliferous strata, first established by my observations during this journey, and those made in the following year in the neighbouring valley of Niti, is of special importance, as it supplies an unquestionable basis on which speculation as to the geological history of this vast mountain region may now be founded.

The most important village in Juhar is *Milam;* the next is *Martoli*, and, as a natural consequence, there is a feud between them. The men of Milam are, however, generally recognized to be the most enlightened and most enterprising of the Juharis, *i.e.* people of Juhar, and much superior to any other branch of the half-bred races, commonly spoken of as *Bhotiyas*, found along this part of the frontier between India and Tibet.

Milam, though large for Juhar, is in reality but a small village. The houses are usually built of stone, often whitewashed, two-storied, and roofed with slates. The inhabitants are almost wholly traders, agriculture being of quite secondary

importance with them. The crops, such as they are able to raise, are wheat, the beardless barley of Tibet, and two species of buckwheat, *Fagopyrum esculentum*, *Ogal*, and *F. tataricum*, *Phaphar*; besides mustard and turnips. The year of our visit the wheat and barley were very poor, hardly more than 15 inches in height, owing to an unfavourable season, with less rain than usual.

The trade with Tibet is carried on almost exclusively by the Bhotiyas distributed along the higher valleys of the Himalaya, the Tibetans taking little part in the carrying business on the south side of the passes. The chief articles dealt with are salt and borax from the Tibetan side, which are exchanged for grain from the Indian side, miscellaneous merchandise being taken to Gartok, a mart beyond the Satlaj. The inhabitants of the parts of Tibet contiguous to Kumaon and Garhwal—and the same may be said of those bordering on Nepal—are almost wholly dependent on foreign supplies of grain for their sustenance, their

PEAK OF NANDA DEVI.
As seen from the south, through a telescope, at a distance of 50 miles.
Elevation 25,693 feet.

own country being almost incapable of producing it. The population, however, is so scanty that the quantity they require is small, and their poverty is such as to afford them little means of supporting an import trade in miscellaneous goods of any considerable value. The material difficulties of transit over the snowy mountains might seem likely to be nearly fatal to the development of the traffic carried on, as it is mainly on the backs of goats and sheep, which can only carry loads of 20 or 30 lbs. weight each. It has been estimated that the trade of Milam amounts in value to upwards of 60,000 or 70,000 rupees, each way, during the season. Fortunately, there is perfect free trade on our side, though the Tibetan authorities exact a duty on all imports.

A cross-breed of horned cattle, called *jhobu*, peculiar to the borders of Tibet, is also employed in this carrying trade, though less extensively than goats and sheep, the multiplication of which animals is favoured by the small number of beasts of prey, such as abound on the outer ranges of the Himalayas. The jhobu is used for the heavier and more bulky merchandise, as well as for riding by the more wealthy Bhotiyas. This breed, which is called *jhobu* by the Bhotiyas, and *dzo* by the Tibetans, is a cross between the Indian bull and the Tibetan or yak cow. The best are said to be raised in the neighbouring valley of

Niti. It is more tractable and less uncouth in its appearance than the shaggy yak, which has much of the fierce look of the bison. The yak is incapable of supporting a hot climate, to which the jhobu is better suited, being from its Indian blood less impatient of heat, and hence more fitted for the Bhotiya trade, which at times involves journeys into the warmer valleys of the Himalaya.

A good *jhobu* is valued at from twenty to thirty rupees, while a yak, called by the Tibetans *chanwr*, costs only seven to twelve rupees. The other cross-breed, between the *chanwr* bull and the Indian cow, is said to be far less valuable than the jhobu. These mule races are said to be sterile *inter se*, but to breed with the pure stock of either species.

The load of a jhobu is about 120 lbs., or equal to that of three men, and the ordinary distance they can travel in a day is about 10 or 12 miles. The cost of a goat or sheep varies from one to two rupees, and they are seldom driven more than 5 or 6 miles a day.

The Bhotiyas of Juhar are smart and intelligent men, decently educated, all things considered, and even have some knowledge of Hindi literature, such as it is. They are commonly short and stout, and some of them decidedly obese. Their dress consists of a long coat, called *baku*, the skirts reaching below the knee, of white or grey woollen cloth, with loose trousers to match. They are cheerful and well-mannered. Theft is unknown among them, and their chief vice is drunkenness, to which they are somewhat addicted.

We employed the interval required after our arrival at Milam for the necessary preparations for our journey into Tibet, in making an excursion up the great glacier which fills the head of the Gori valley, and from which that river issues, with the object, amongst others, of measuring its motion. The glacier terminates about a mile and a half above the village of Milam at a height of about 11,590 feet above the sea. Its main trunk extends nearly 10 miles up the valley, which there ends abruptly in a ridge, on which is a cluster of snowy peaks, the altitudes of which are from 22,500 to 23,600 feet. Six tributary glaciers of smaller dimensions occupy as many ravines or valleys on the west, on which side the mountains are extremely lofty, culminating in the great peak of Nanda-devi, before referred to. Three smaller glaciers descend from the somewhat lower ridge to the east of the central valley. The ice from two or three of these tributaries does not, however, now join the main glacier, though it appears to have done so formerly from all of them.

The line that I selected on which to fix marks for the measurement of the motion of ice was 7 miles from the lower extremity of the glacier, which was here about 4000 feet across. The elevation of the surface of the ice was about 14,600 feet, and the highest part of the main stream of the glacier rose in a great dome of clear ice immediately above, reaching probably to a height of 15,000 or 16,000 feet. Beyond this the glacier bifurcated to the right and left, and the branches were lost sight of behind projecting angles of rock.

The most remarkable feature of this glacier was the immense quantity of *débris* with which its lower part was covered, so that for the last 5 miles no clear ice at all could be seen, the entire surface being concealed by a confused mass of rocks and *débris*, with many large pools of water scattered over it. The indications thus afforded of a great shrinkage of a glacier of former far greater proportions are everywhere confirmed. The lateral moraines show this in a striking manner. In many places several parallel lines are to be seen one within the other, left stranded on the valley floor, as the main body of the glacier has shrunk and subsided. The enormous accumulation of *débris* that has taken place at the extremity of the glacier entirely covers and conceals the ice, so that the terminal face, instead of

being convex, as is usual, is concave, the ice on the flanks being protected by the *débris* piled over them, while the centre is being constantly eroded by the river which rushes, a giant at its birth, from the terminal cave that appears in the concavity formed by the projecting flanks.

These signs of the gradual diminution of this glacier are confirmed by the testimony of the people of Milam, who point out a rock up to which the ice formerly extended, but is now several hundred yards below its termination. But a still greater and more ancient extension is shown by an old moraine that is to be seen to the east of the village, which reaches for about a mile below it, or altogether not less than 2¼ miles from the present end. The evidence of any extension of this glacier farther down the valley is wanting, though there is probably another ancient moraine filling up the mouth of the ravine at which the village of Martoli is situated. This mound rises to about 500 or 600 feet above the present level of the river, but whether it has been caused by a former extension of the

THE GLACIER OF THE GORI.

great Gori glacier, or by the glacier which exists higher up the ravine, or is an accumulation formed by running water, is somewhat uncertain. Such accumulations at the ends of lateral ravines are to be seen in all mountain valleys under similar circumstances, and villages are commonly placed upon them, as, from their constituents, they afford a surface more capable of tillage than is usually to be found elsewhere.

Our route up the great glacier followed a track along its east flank leading to grazing-grounds used by the people of Milam. The vegetation was scanty, but interesting. Among the shrubs last seen were two roses, *R. sericea* and *R. Webbiana*, white and red. One of the most conspicuous of the flowers was an *Allardia*, a genus of Himalayan and Central Asian Compositæ, with a beautiful rosy ray. On some of the moraines we crossed I found Lower Silurian fossil remains, among which was a trilobite, the first, as I believe, ever met with and recognized as such by any traveller in these mountains. The rocks further down the valley were solely metamorphic schists, the fossiliferous beds all lying to the north-eastward, higher up the mountain face, from which the fossils, among which were remains

of brachiopods as well as trilobites, had been brought down by glaciers and avalanches.

In several places small streams of water running down the mountain-sides cut quite through the lateral moraines, occasionally keeping open deep-recessed spaces in the ice several hundred feet in breadth. At the meeting of one of the side glaciers with the main ice-stream, the veined structure was very distinctly seen in both, the bands curving upwards towards the line of junction where they were nearly vertical, the beds of apparent stratification being in planes perpendicular to the lines of pressure, quite in accordance with the accepted views of the method of the formation of glacier ice-structure by the combined result of the pressure and motion of the ice-particles.

While on the glacier, we witnessed the fall of a magnificent avalanche from among the great snowy peaks at its head. Its approach was notified by a loud roar, like that of distant heavy artillery; then what appeared to be a pure milk-white torrent poured down a ravine, followed by a vast white cloud of snow, having the appearance of a great column of steam, or of smoke after an explosion of gunpowder, thrown up 100 or 200 feet or more into the air when the avalanche reached the surface of the glacier.

In order to ascertain the rate of movement of the glacier, I revisited the marks that had been set up on August 29, on my return from Tibet on September 30. The results were as follows:—

	Movement in 32 days.	Movement in 24 hours.
	ft. in.	in.
Station 1. At 900 feet from cliff on east ...	33 0	12·4
„ 2. „ 1052 „ „ „ ...	34 9	13·0
„ 3. „ 1289 „ „ „ ...	38 0	14·7
„ 4. „ 1763 „ „ „ ...	44 9	16·8

These rates do not differ in an important degree from those commonly observed in the summer months on glaciers in the Alps, which lie between 9 and 27 inches in 24 hours.

The motion of a smaller glacier, that of the Pindar, on the outer face of the Himalaya, observed by me in the month of May, was found to be 9½ inches for the 24 hours at the centre of the clear ice; and for the whole period between May 21 and October 15, when it was revisited, the motion was 98½ feet, giving an average rate of just 8 inches in the 24 hours. The surface of the ice where the measurements were made in this case was at an elevation of 13,000 feet, and the extremity of the glacier was at 11,900 feet.

On the Milam glacier we found, lying in considerable numbers, the remains of locusts, which had been preserved from decomposition by the cold for a period of two or three years, so far as I could learn, the last flight of locusts having occurred at about that time. Such flights penetrating into the very heart of the snowy mountains are not uncommon, the insects being, no doubt, facilitated in their journey by the periodical winds which so regularly blow from the plains of India up the valleys during the day hours, from about 10 a.m. to sunset.

On August 29, at our encampment 6 or 7 miles above Milam, we caught a bat flying about at dusk. It seemed rather a curious locality in which to find such a creature. Here, at an elevation of 13,700 feet, the thermometer rose to 57° at about the hottest time of the day, and the temperature of the earth about 3 feet below the surface was 48°. There was no trace of snow on the ground or neighbouring rocks, and the vegetation was abundant. At Milam at 6 p.m. on

October 2, at 11,500 feet, the temperature of the earth 1 foot below was 59° 6, and at 3 feet below the surface, 55°. The maximum temperature during the day was a little below 60°.

The terminal moraines of the glacier extend to the junction of a side stream, the Gonka, with the Gori, and have forced the Gonka up against the face of the mountain, into which that stream has now cut itself a bed in the solid rock. The gradual depression and erosion of the Gori river has cut away a series of terraces out of the unconsolidated mass of the moraine, on the highest of which the village of Milam is situated. The lower terraces are cultivated, and the soil is in all respects identical with that laid out by the river that now flows below them.

PLANTS FOUND AT AND NEAR MILAM, 11,000 TO 13,000 FEET.

Clematis orientalis.
Thalictrum platycarpum.
Ranunculus—sp.
*Aconitum Napellus.
„ heterophyllum.
Berberis vulgaris.
Draba lasiophylla.
Sisymbrium himalaicum.
*Brassica campestris.
Lepidium capitatum.
*Silene inflata.
Stellaria decumbens.
Arenaria serpyllifolia.
„ holosteoides.
Impatiens Thomsoni.
Thermopsis barbata.
Caragana crassicaulis.
Guldenstædtia himalaica.
Astragalus himalayensis.
„ multiceps.
Cicer songaricum.
*Potentilla fruticosa.
„ ambigua.
„ bifurca.
Rosa Webbiana.
„ sericea.
Artemisia scoparia.
„ biennis.
„ sacrorum.
Cousinea Thomson.
Crepis glauca.
Lactuca rapunculoides.
Campanula cashmiriana.
„ aristata.
Androsace Chamæjasme.
Gentiana cachemerica.
Pleurogyne carinthiaca.
Polemonium cœrulium.
Eritrichium strictum.
*Verbascum Thapsus.
Pyrus aucuparia.
Cotoneaster microphylla.
Saxifraga flagellaris.
„ Stracheyi.
*Ribes grossularia.
„ glaciale.
Sedum asiaticum.
„ trullipetalum.
„ Ewersii.
Epilobium latifolium.
* „ roseum.
„ origanifolium.
Pituranthos nuda.
Sesili trilobum.
Pleurospermum Candollei.
„ stellatum.
Heracleum Brunonis.
Lonicera glauca.
„ obovata.
„ alpigena.
Galium triflorum.
Nardostachys Jatamansi.
*Erigeron alpinus.
Anaphalis Royleana.
Allardia tomentosa.
Tanacetum tibeticum.
Axyris amaranthoides.
Polygonum islandicum.
* „ aviculare.
„ tubulosum.
„ glaciale.
„ polystachyum.
Rheum Webbianum.
Hippophaë rhamnoides.
Parietaria debilis.
Ephedra vulgaris.
*Juniperus communis.
„ pseudo-sabina.
„ macropoda.
Allium victorialis.

Scrophularia lucida.
Veronica ciliata.
„ biloba.
Pedicularis megalantha.
„ tubiflora.
Orobanche epithymum.
Elsholtzia eriostachya.
*Origanum vulgare.
Nepeta spicata.
„ discolor.
Scutellaria prostrata.
Potamogeton pectinatus.
*Scirpus setaceus.
„ caricis.
Hierochloa laxa.
Deyeuxia scabrescens.
Avena ænea.
Danthonia cachemyriana.
Bromus tectorum.
Agropyron longe-aristatum.
„ semicostatum.
Elymus sibiricus.

N.B.—An asterisk prefixed in this list, and in subsequent parts of this journal, implies that the species is also British.

September 2, 1848. *Milam to Shelong*, 6 *miles*.—All preparations being completed, we left Milam this day. Our retinue consisted of sixteen Bhotiyas, taken two or three from each village in the valley, so that the pains or profits of the expedition might be fairly distributed. The nominal head of the party was one *Bachu*, a relation of the principal native official in Juhar, stout and short, but young and active, not very wise, yet intelligent enough, reputed to be a good sportsman, and having no objection to a glass of grog. He was provided with a jhobu of his own, but was the only one excepting ourselves who habitually rode. Next to him in importance was *Boru*, the *Padhan* or headman of *Tola*, a village near Milam; he was oldish, thin, and taller than the ordinary run of his countrymen. He was a shrewd fellow, and had been over a good deal of *Hundes* (*i.e.* country of the Huns), as the part of Tibet bordering on the Indian watershed is commonly called by the Hindu inhabitants of this part of the Himalaya. *Boru* naturally became our guide, and on him would devolve the duty of answering any questions put by over-inquisitive Tibetans who came in our way. In doing this, as he could not have given a satisfactory account of us if the truth had been strictly attended to, he never failed to draw freely on his imagination, and with most successful results. To the rest of our people were allotted the miscellaneous functions of loading and driving the cattle, pitching the tents, getting firewood and water, cooking our dinners, and performing other domestic services.

We were victualled for a month, as no provisions were to be got after we had once entered Tibet. We carried two small tents, 8 or 10 feet in length, one for our own use, the other for the Bhotiyas; and if it be asked how our sixteen men could get into one such tent, it must be explained that there is an aristocracy even in the heart of these snowy mountains, who appropriate such comforts of life as are to be had to themselves, and that the underlings were expected to live wholly in the open air, day and night, which they did without any apparent inconvenience, being as rough and hardy as any of the twenty jhobus that carried our baggage.

The jealous policy of the Chino-Tibetan Government rigorously excludes all strangers from its territories, and it is only by adopting some disguise and avoiding any contact with the people, or, in some rare cases, by boldly advancing in spite of the prohibitions of the authorities, that it is possible to penetrate to any distance into the inhabited parts of Tibet. On the present occasion we adopted the quieter plan, and made such modifications of our costume as would enable us, without attracting special notice, to hurry past any Tibetans we met unexpectedly, and with whom we might be forced into proximity; for we altogether gave up the idea of being able to pass ourselves off as authorized travellers if we were distinctly seen. Hats

were abandoned, their places being supplied by felt skull-caps, such as are worn by people of the country, while over our ordinary clothes we put on the Bhotiya *baku*, a garment of the cut of a dressing-gown, which answered sufficiently well the purpose of a great-coat.

Our scientific equipment consisted of a few bundles of paper for drying plants; a small theodolite, azimuth compass, and reflecting circle; a short barometer, which I had myself prepared for the purpose, suited for the great elevations at which we were about to travel, with a spare tube in case of accidents; and thermometers, with apparatus for observing the boiling-point of water. The barometer was carried by one of the men; all the other things were packed on the jhobus' backs, and travelled with perfect safety.

We left Milam about noon. A token of the Tibetan affinities and sympathies of the inhabitants stands a few hundred yards from the village, by the side of the path we followed, in the shape of one of the Budhistical buildings commonly called *Mane-pano*. The structure in this instance is a rudely built dry stone wall, 20 or 30 feet long, 4 or 5 feet thick, and as many high, with a recess in one of the longer sides in which are inserted three wooden cylinders revolving on vertical iron axles, while a fourth is similarly fixed in one of the ends. These praying-cylinders, as they have been called, are without ornament or external inscription. It was not possible to examine their interior, but such articles are commonly filled with rolls of paper covered with sacred texts, or inscribed many hundred times over with the sacred legend, "*Om mane padme hum*," which signifies, "O Lotus-bearer, Hun!" the mythical personage thus addressed being an important character in Budhistic ritual.

On the top of the wall are placed slabs of stone, on which the same words are roughly carved. The devout passer-by, touching the cylinders, causes them to revolve, and each mystic sentence within them, as it is carried round, becomes endowed with the same efficacy to the passer as though it had been spoken by him in adoration. Hand-machines of a similar description, often richly carved in brass or silver, are used by pious individuals; but some of the monastic societies of Tibet employ for their more serious devotions a more ponderous liturgy, and call to their aid water-power and a praying-cylinder 6 feet high.

Crossing the old moraine before noticed, which is covered with barberry, gooseberry, and rose bushes, we descended and passed the stream, called on the old maps *Gonka*, by a wooden bridge. Gonka is really the name of the ground near the bridge, though it is applied to the bridge also. It means "below," and has been given to this locality because it is below an old fort on the moraine. The river itself, as is often the case in Kumaon and Gurhwal, has no special name. In a state of society such as here exists, geographical names, as Humboldt has well observed ('Aspects of Nature'), are only necessary to distinguish places which are likely to be confounded one with another. Thus we find that in these mountains—and this holds good in many other parts of India—the great rivers are called by the inhabitants simply *Ganga*, *i.e.* "the river," while distinctive names are hardly used or known except by strangers. So with respect to the mountain peaks and ranges, many have no other names than those of the *Deotas*, or local deities, who are supposed to reside on them. The passes, pasture-grounds, and regular halting-places have definite names, and it will often be found that one of these supplies the deficiency, when a European traveller insists upon having a name given to him, for peak, ridge, or other locality, which in reality has no recognized name at all.

The old fort is a small enclosure surrounded by a ruinous wall a foot or two high, regarding which stories are told of heroic defences by the ancient people of *Milam* against lowland invasion. Regarding the origin of this ancient people of

Milam, tradition says that an adventurer from *Daba*, the chief place in Guge, the neighbouring province of Tibet, was led over the mountains by a mysterious stag to the place which he called *Mi-dum*, or *lame man*, inasmuch as he was lamed by his walk over the passes. There were stories also of a dragon, a standard dish in the myths of Tibetans, and of an old woman—a witch, I suppose—but it was not clear what these had to do with the foundation of *Milam*. It is curious that the *Shea*, a stag with great antlers, which enters into these histories, though now quite unknown in this part of the mountains, has a real existence. It is the *Cervus Wallichii*, of which specimens have been lately got from Tibet by Mr. Hodgson, as well as from the north of Kashmir by Captain Cunningham. Some of the names of the places on the road we were following are connected with these traditions: *She-long* is the place where "the stag got up;" and *Sam-gong*, "happy heart," the spot the beauty of which captivated the trans-nivean immigrant. [I have since been informed by Dr. W. E. Blanford that the greatest doubt attaches to the existence of Hodgson's *Cervus Wallichii*, though it is possible that the stag of Kashmir may have been found in the Bhotiya valleys of Kumaon.]

My own taste, I confess, differed from that of the Tibetan explorer. The valley of the *Dung* river, as the stream along which our route led us may more properly be called, is nothing more than a mere ravine, down which rushes a roaring torrent jammed in between mountains, that rise from the very edge of the water either in shattered cliffs, or more frequently in great slopes of loose *débris* that extend upwards without a break for thousands of feet. The vegetation was miserable, the heat of the sun and the glare from the bare surfaces were most disagreeable, and the whole aspect of nature was wretched in the extreme.

The road, which, however, hardly deserves the name, in spite of an affectation of repairing it that had been gone through in our honour, is a track, and that a bad one, keeping generally near the stream, sometimes pretty level over a talus of *débris*, now descending to cross a side ravine, now ascending abruptly over some prominent point of solid rock that juts out into the centre of the valley. The accumulations of mud and stones heaped together by torrents, avalanches, and glaciers, over which the road goes, though compact and firm enough when dry, are quite otherwise when the snow is melting or after any considerable fall of rain, and this road then becomes difficult and even dangerous. In these heterogeneous accumulations of loose material, curious pinnacles or rough cones of various sizes often detach themselves from the general mass as it decays, capped with stones which have afforded protection to the summit of the pile, while the materials around it have melted away under the action of rain or weather. Great fragments of rock of considerable dimensions are thus left perched high in the air on very slender columns of mud and stones, in positions which at first sight seem strange enough. These pinnacles are frequently met with in other places on the borders of Tibet, where the conditions of soil and climate are similar. I remember, also, to have seen precisely the same thing in some of the unconsolidated boulder strata of the Siwalik hills, and the analogy with the ice-tables on glaciers is complete.

As we increased our distance from *Milam*, the vegetation became more and more scanty, and we passed the last bushes worthy of the name (* *Juniperus communis*) a mile or so before we reached *Shelong*, where we halted. As far as the pass of *Unta-dhura* there is only one route from the valley of Juhar into Tibet, though beyond that pass a choice is possible between two or three lines. Consequently, on this portion of the route the frequent demands for firewood for travellers, and the attacks of sheep and goats for fodder, have nearly annihilated the vegetation, which, had it been left undisturbed, would have been miserably poor.

Shelong is a mere ledge a few hundred feet square on the valley-side, at an

elevation of 12,860 feet. It supports a show of vegetation and tries to be green, but the multitudes of sheep that pass over it, succeed in depriving it of any claim to such an epithet. The plants observed were *Astragalus strictus*, an *Artemisia*, *Sedum trullipetalum*, and *Cotyledon orecides*. Immediately above us rose a great talus of *débris* issuing from a narrow rent in the cliffs behind, and spreading out into a broad-based cone below. These cones of *débris* are among the characteristics of these regions; their formation seems partly due to avalanches, and partly to torrents caused by melting snow, which take their place later in the season, and they often terminate as this one did, in a snow-bed. Such accumulations, when their ends are cut away by the eroding action of streams at their bases, often exhibit an appearance of stratification, which may cause them to be mistaken for river-deposits at great elevations above the existing waters, where, in fact, no such deposits have ever been formed. The origin of this false stratification is readily understood: the fresh material which is brought down from above, as it rolls onward, spreads out and covers up, with some regularity, the older and inferior parts of the slope.

A first trial of a ride upon a jhobu, though highly satisfactory as to the sure-footedness of the animal, gave but a sorry augury of the pleasures of a long day's journey. We thought it prudent on this journey to use the ordinary saddle of the country, as it was important to avoid anything that would attract attention, and to those not accustomed to them these saddles are excessively uncomfortable. I have, however, subsequently used an ordinary English saddle on a jhobu's back with perfect success. The pace of the jhobu is very slow, hardly more than 2 miles an hour at best, and often much nearer a mile. They are usually quiet beasts, though sometimes impatient when being mounted or loaded. They are driven or led by a nose-rope fixed in the cartilage between the nostrils in the ordinary Indian fashion of dealing with horned cattle, but it is hardly worth while to attempt to guide them, as they resolutely take their own way, and it is soon found that they may be trusted implicitly. Like other animals, they are treated by their human masters with a peculiar language. *Chu* and *Ryu* are the words of exhortation most common, the latter being the more emphatic. Whistling is in these regions an invariable accessory to all driving, either of horned cattle or sheep, but with the latter animals the noise is incessant and accompanied by the most outlandish guttural sounds, which it would be difficult to imitate with a civilized throat, and quite impossible to represent upon paper.

At 9 p.m., therm.—air, 45°; earth, 9 inches below the surface, 52°.

September 3, *Shelong to Topidhunga*, 13 *miles*.—At a.m., therm. 44°. To-day we were to cross the first great pass, and here, therefore, we left behind our ordinary servants, and assumed our complete Bhotiya costume.

The road still follows up the same valley, with the same characteristics as yesterday, as far as *Dung*, shortly before reaching which place we passed over the terminal moraines of a small glacier, the ice of which was visible a few hundred feet above us on the right.

Dung, 13,570 feet above the sea, is the name of the halting-places on both sides of the river, near the junction of the stream from the *Lasar* glacier, and that from the *Shikal-gal*, another glacier, up which our road lay. Attempts have been made to establish a route over the *La-sar* (*La*, "pass," *sar*, "new"), which will be seen from the map to lead direct to *Chirchun* and Tibet generally; but the difficulties—glacier crevasses, I think—are said to have been found insurmountable, and the only road now used is that over *Unta-dhura*, which leads up the *Shikal-gal*. The river at *Dung* is crossed by a solid causeway, built on some large masses of rock which have fallen from the cliffs above or have been brought down by the glacier, and which

now form a sort of natural bridge. There are a great number of these fragments of rock near this spot; the majority lie on the right bank of the river, from which they have fallen, but many are found also on the left bank. Good shelter is to be had on the left bank under some of these rocks, which form spacious caves, or, as they are here called, *udyar*. These masses of rock are composed of an impure concretionary limestone, which here forms the upper member of the Lower Silurian series, and I have seen rocks which no doubt form a continuation of the same beds as far nearly as the *Niti* pass.

The present extremity of the *Shikal-gal* is about a quarter of a mile from *Dung*, but there are evident marks of the glacier having formerly extended to that place. The face of the ice at its lower end forms a great precipice, the lateral portions projecting beyond the centre, so as to give it a general concave outline, like the *Gori* glacier. The conchoidal structure is finely exhibited. Keeping to the southern side of the lateral valley we had entered on passing *Dung*, we at once ascended and crossed the glacier. This was done with remarkable ease, the ice being very little crevassed, and its whole surface being entirely covered with broken and disintegrated stones. A tedious and disagreeable ascent along the north moraine, over sharp angular fragments of Silurian limestones and the quartzites that cap them, brought us to a flat-topped knoll of firm ground called *Bompras*, at an elevation of about 14,500 feet, on which we found a few new plants, *Arenaria glandulifera*, *Erigeron alpinum*, and *Lloydia serotina*. Here we left the *Shikal-gal*, and, crossing over a low ridge, came upon another smaller glacier called the *Sheta-gal*, which ends before it can effect a junction with the *Shikal-gal*, into which, therefore, it pours, not ice, but only a small stream of muddy water. *Bompras*, having a little vegetation, is sometimes made a halting-place for parties travelling with sheep. Among the last plants which straggled up to this spot, we found *Carex Lehmanni*, *Saussurea sorocephala*, *Arenaria glandulifera*, and a larkspur, *Delphinium Brunonianum*. The latter, which has a strong smell of musk, is one of the flowers to the poisonous effects of which the hill people attribute the distress caused by the rarefaction of the air at great altitudes.

I may here remark that my own experience leads me to the conclusion that the pains and aches of which travellers complain at great heights, are almost entirely to be placed to the account of the bodily exertions they usually make in their ascent in the rarefied atmosphere. I have always found that so long as I remained at rest, I felt no real inconvenience whatever at any height that I ever reached, up to about 18,400 feet. A very moderate amount of exertion, however, at the greater elevations, is sufficient to bring on violent headache and painful shortness of breath. Above 13,000 or 14,000 feet even, when remaining quite still, I have frequently found myself drawing a long breath, hardly different from sighing, the lungs, I suppose, demanding more air than they could get with their ordinary degree of action. Below 11,000 or 12,000 feet, I am not conscious of ever having noticed anything abnormal in my respiration. During this ascent, by sitting quietly on our jhobus we escaped all inconvenience, though the difficulty of breathing was felt the moment we attempted to exert ourselves by walking up any part of the mountain. The beasts got on wonderfully well, though evidently not by any means insensible to the rarefaction of the air. It is, I presume, from the groans which the yak utters in working its way uphill under such circumstances, that it has received its specific name of *grunniens*; and the jhobu, a hybrid between the yak and Indian cow, inherits this peculiarity.

The morning had been cloudy from the beginning, but before we had got half up the ascent we were in a dense mist, which almost wholly prevented our seeing where we were going, excepting that we had an occasional glimpse of the glaciers

with which we were at times surrounded. We were, however, more fortunate on our return journey, when we saw everything most satisfactorily, otherwise it would have been difficult for me to have said much of this day's journey.

The *Sheta-gal*, or White glacier, is no doubt so called from its general clean appearance. It forms a wide basin-shaped expanse fed by several small tributaries. The mountains rise from it in precipices, the strata being violently shattered and contorted. Along its south-east face the dip is nearly vertical, but otherwise on the whole northerly. The south-east moraine of this glacier is of black slates, I think probably Jurassic, and the strata from which it is derived are perhaps connected with the Jurassic beds that crown the *La-khur*, a pass a few miles to the east of *Unta-dhura*. The north-west moraine, however, and the ridge beyond it on which is the pass of *Unta-dhura*, are probably Palæozoic, the moraine being chiefly composed of a pale quartzite which caps the Palæozoic beds of this part of the Himalaya. The ridge of Unta-dhura is, I think, of the impure limestones already noticed at *Dung*, which occur under these quartzites. On these points, however, there may be some doubt.

Having crossed this glacier, we reached the foot of the final ascent of about 1000 feet which ends in *Unta-dhura*. This is very steep at bottom, and is covered with loose fragments of black slaty limestone, without the least appearance of vegetation on any part of it. There was no snow whatever on the ground on this ascent, nor on the summit of the pass, the immediate approach to which is tolerably easy for some distance.

We reached the top at about 4 p.m., the weather having got gradually worse as the day advanced and as we ascended, till the afternoon closed with a decided fall of sleet and rain, which, though not in any great quantity, was painful in the extreme, owing to the violence of the southerly wind. This was so high that it was impossible to put up the barometers on the crest of the pass, and the attempts I made to get water to boil were for a long time ineffectual, so that we were delayed here till past five o'clock. The cold we experienced on the pass was much more dependent on the wind than on the low temperature of the air, for the whole ground was worked up into soft deep black mud by the feet of the cattle that had lately crossed, and the snow melted as it fell, the thermometer standing at 33°·5. But the quantity of heat lost by the human body in a strong wind, even with external temperatures as high as 45°, is distressingly great, more especially if the air is much rarefied or very dry.

The height of the pass is 17,530 feet. It is at a break in the precipitous face of the mountain that rises from the *Sheta-gal* glacier. The ridge on either side of the pass had patches of snow on it at no great height, and on the northern slope a considerable accumulation of snow remained that extended 200 or 300 feet down, apparently the effect of the drift caused by the southerly diurnal winds that so constantly sweep through the gap in which the pass lies. The snow-line may be estimated to lie a few hundred feet above the pass. From the accounts of former travellers, it would appear that the ridge is hardly free from snow on the south side at the end of May, and that the descent to *Topidhunga* on the north is then chiefly over snow quite to the bottom.

As is so often the case among high mountains, the view from this pass is not very striking, the immediately surrounding heights preventing any distant prospect. The whole scene is one of utter desolation among huge precipitous barren mountains, the strata violently contorted and shattered, with snow and glaciers lying on all sides. Under favourable circumstances there is still, no doubt, much that is grand to be found in such situations, but the mists which hang over the passes of the Himalayan watershed during the summer months, when alone

they can be crossed with safety, give a traveller few opportunities of really seeing where he is going; and the long-continued exposure to the extreme violence of the winds, to which he is almost always subjected on these passes, too often effectually quenches any sparks of enthusiasm which might otherwise have survived an ascent to an elevation of 17,000 or 18,000 feet. This certainly was the case with us now; nor was our descent from *Unta-dhura* made under a happier star. It commenced over filthy mud in a miserably cold wind, with drifting rain and sleet, and ended in darkness, in which we reached our tent at *Topidhunga*, worn out by fatigue and cold, and in a state of extreme wretchedness. Nor were our troubles concluded even then. In such cold and rain, a fire of some sort was an essential to anything like comfort. But the green bushwood soaked with wet, which had been brought for fuel, and nothing else was to be had, filled the tent with such horribly pungent smoke that it was quite intolerable. No approach to a blaze could be made, even with the help of a magnificent pair of bellows, which seemed to form part of the regular equipment of our Bhotiyas, and to have been specially intended to meet such an emergency as the present. We therefore had to put up with a cold and scanty supper, and to prepare our beds on the ground, which was thoroughly saturated with water, and which was not the more sweet or pleasant for having been used, as it seemed to us, as a halting-place for sheep in all past ages. Thus ended our first day painfully enough.

The vegetation recommenced on the north face of the pass, after a descent of about 500 feet, with a cruciferous plant, *Cheiranthus Himalayensis*, *Elsholtzia eriostachys*, var. *pusilla*, and the curious tufted *Thylacospermum rupifragum*, the dense hemispherical cushion-like masses of which, a foot or more in diameter, might easily be mistaken for moss by a casual observer. A few other species were observed as we came down, but in such miserable weather botanizing was not an exciting task, and night soon made it altogether impossible.

On arriving at our halting-ground at *Topidhunga*, we found that a Tibetan of *Kyunglung* on the Satlaj was already there, on his way home from Milam with sheep loaded with grain. Now, as *Kyunglung* was near the place to which we had intended to go in the first instance, and as it was therefore desirable that we should keep out of this man's sight, we decided to halt a day, to let him get on and out of our way.

September 4. *Halt at Topidhunga.*—After a wretched night, we woke to find our hopes of finer weather doomed to be disappointed, and we passed the day, during the greater part of which it was raining and snowing, in our tents at this place, which has been most deservedly called by other travellers a dismal pit. *Topidhunga* is a small piece of open and level ground about 300 or 400 feet above the *Girthi* river, a stream which, flowing westward, falls into the *Dhaoli* near *Malari*, in Garhwal. It lies at the bottom of a deep gorge between *Unta-dhura* and the *Kyungar* pass. The elevation, 14,950 feet, is such that the vegetation is only herbaceous. The chief novelties were three gentians, *G. nubigena*, *tenella*, and *squamosa*, all common in this region; *Veronica ciliata*, *Lychnis macrorhiza*, *Androsace villosa*, *Isopyrum grandiflorum*, *Artemisia biennis*, *Anaphalis nubigena*, *Microgynæcium tibeticum*, **Poa bulbosa*, **pratensis*, and **alpina*. In this neighbourhood, also, was found the only fern seen in these lofty ranges, **Cystopteris fragilis*. Our firewood, obtained from species of juniper and Lonicera, was brought from a mile or so down the river. As to outlook, we had almost none, and clouds choked up the gorge nearly all the time we were here. The thermometer varied from 34° to 41° during the day, the snow melting almost immediately it fell.

September 5. *Topidhunga to Laptel*, 8 *miles.*—At 8 a.m. at *Topidhunga*, thermometer 37°. To-day we resumed our journey, leaving *Topidhunga* at

9 a.m., and crossing the *Kyungar* pass, the height of which is probably about the same as that of *Unta-dhura*. I unfortunately broke my barometer on the top of the pass, and was therefore unable to make any certain measurement of its height.

The *Girthi* river, which flows in a most savage gorge along the south face of the *Kyungar* ridge, follows a line of dislocation of the strata, which seems to be continuous with that found further to the west along the *Hoti* river. The rocks immediately to the south of this line are Palæozoic, those to the north being Triassic and Rhætic. To the south-east of *Topidhunga*, the line of separation of the formations probably nearly follows the road we had taken, as far as *Dung*, beyond which I have no information. *Girthi* is a deserted village on the stream which is named from it, about halfway between *Topidhunga* and *Malari*, on the *Dhaoli* in Garhwal; near it are said to be lead and copper mines, but they are only occasionally worked, and then on the most insignificant scale. The Government, which possesses the proprietary right in all the mines of these mountains, has, I understand, not often made a larger sum than five rupees per annum from the *Girthi* workings. The ascent to the pass is up a small tributary of the *Girthi* river, and is excessively steep and rugged, lying over or among fragments of the surrounding cliffs of all sizes. The rocks are limestones mixed with black slates, containing fossils, probably Liassic. The strata are wonderfully shattered and disturbed, and some immense sheets of bare rock, dipping at an angle of 45° to the south, were conspicuous objects on our left. The summit of this pass is a long rounded depression between high bare crags. It rises to about 17,500 feet. The ground is covered with small angular fragments of stone without any appearance of soil, and this is commonly the case at these great elevations. There seems to be a transverse rupture of the strata along the ravine up which we came, which is continued through the opposite face of the ridge down to the *Laptel* river, the dip having been in opposite directions on our right and left hand the whole way.

The vegetation on the ascent was very scanty; a few plants were, however, noticed almost to the very top, namely, two Boragineæ, *Eritrichium spathulatum* and *Microula Benthami*; a nettle, *Urtica hyperborea*; and **Taraxacum officinale*, the common dandelion of England. Besides the foregoing, may also be mentioned a Ranunculus, common and very varying in size and form, *R. hyperboreus*, *Arabis alpina*, and **Thalictrum minus*. We crossed no snow whatever, except a small bed in a sheltered place at the bottom of the very narrow ravine up which we came, and the mountains with a south exposure were still clear of snow for several hundred feet above the pass. On the north face a large bed, evidently perennial, lay a little below the summit. This is very usually the case on these passes, and a similar patch is often to be seen under the lee of a peak, from the south face of which the violent southerly winds, which, as before observed, almost constantly blow during the afternoon over these passes, sweep all the snow, which consequently drifts into some sheltered place just under the ridge.

The view from the pass, though striking, was not very picturesque. The weather was still cloudy and unpleasant, and *Unta-dhura* looked dismal enough behind us. To the north the prospect was rather more cheerful; patches of sunlight and clouds less dense gave hope that we should enter a more agreeable climate as we advanced. The range of *Balch*, that still lay between us and Tibet, was 10 or 12 miles distant, and seemed almost snowless, though certainly rising above 18,000 feet in altitude. The pass over which we were to go was clearly seen, and in the valley below us lay the halting-ground of *Laptel*, looking brilliantly green, with deep red cliffs (Lower Carboniferous) rising close behind it.

The descent from the pass, the summit of which we reached at half-past eleven,

lay for a mile or two over a long tiresome slope covered with angular loose fragments of rock. After crossing the bed just under the pass, we saw no more snow; nor is there any sign of a glacier to be met with beyond this ridge. Vegetation commenced in rather a languid way about 1000 feet below the pass, the nettle before named and a yellow saxifrage, **Saxifraga Hirculus*, var. *Hirculoides*, being the first plants met with. The grazing-ground of *Kyungar*, which gives its name to the pass, is a little green spot well down the hill at 15,000 feet, on the edge of a stream coming from the eastward, and near it we found three of the characteristic labiate plants of Tibet, *Nepeta tibetica*, *Lamium rhomboideum*, *Dracocephalum heterophyllum*; also *Draba alpina*, growing on the slopes of loose stones, their roots, in the absence of any soil, penetrating deep among the interstices between the fragments.

Beyond *Kyungar* we came upon a small ridge, which, starting up almost in the centre of the great valley that we had followed from the top of the pass, ran on our left straight down to the *Laptel* river, to which we were descending. We here, for the first time, entered the rotten black shales that represent the Jurassic strata in the Himalayan Mesozoic rocks. The hills formed by these crumbling shales are rounded, and covered with small loose fragments, among which exceedingly hard spherical argillaceous nodules are very frequently found, sometimes containing an embedded ammonite or shell, but oftener a nucleus of iron pyrites without any trace of organization. As we continued to descend, our path lay along a small stream which falls into the *Laptel* river, and the vegetation began to improve greatly. Small shrubs again appeared—*Caragana pygmæa*, *Lonicera glauca*, and *Salix sclerophylla*. A geranium, **G. pratense*, a British species, was common, as well as a polygonum, *P. tortuosum*. The leaves of the last-named plant, and of a euphorbia, *E. Stracheyi*, but especially of the latter, had changed their colour into brilliant reds, and formed most conspicuous contrasting objects on the long, steep, and crumbling slopes of the black shale. A blue violet, *Viola kunawarensis*, and *Corydalis Gortschakovii*, were also found on the descent.

Here, too, we first made acquaintance with the Tibetan marmots, *Arctomys bobac*, called *Phiya* by the Bhotiyas, and our sporting friend Bachu managed to shoot two of them. They live in villages, so to speak, twenty or thirty of their burrows being usually found together, at the mouths of which, if come upon very suddenly, they may be seen squatting (precisely as I have since seen the prairie dog doing in the United States), for they disappear underground in a moment when disturbed. Our specimens were in capital condition, and their fat is considered a specific for rheumatism. The Bhotiyas, I was told, sometimes manage to get the marmots out of their holes by turning a stream of water down them.

The *Laptel* river is a good-sized stream flowing over a broad shingle bed, and is seen to issue from a fine gorge half a mile above the point where we crossed it, again disappearing in a similar cleft as far below. Fording the river at an elevation of about 13,700 feet, a short easy ascent brought us to *Laptel* at 13,860 feet, an encamping-ground of the brightest emerald green, the charms of which were heightened by the utterly bare hills all round. The rills of water that flow down these hills seem somewhat capricious in their effects, at one time running over a bare shingly bed, at others giving rise to a most luxuriant growth of small herbage, which, as at *Laptel*, was in places almost a bog. Besides forms before observed, we here found two shrubby plants, *Myricaria germanica* and *Clematis graveolens*, and **Aconitum Napellus*, *Silene Morocroftiana*, *Lychnis brachypetala*, *Cicer soongaricum*, **Epilobium alpinum*, *Aster tibeticus*, *Lindelofia Benthami*, *Polygonum viviparum*, *Eurotia ceratoides*, *Juncus sphacelatus*, *Carex rigida*, *Allium Jacquemontii*, *Elymus dasystachys*, and *Deschampsia cæspitosa*; also *Gentiana aquatica*,

one of the least showy of the tribe, and everywhere found on the banks of streams at these elevations. *G. tenella* and *Pleurogyne carinthiaca* are also common in similar situations.

We reached *Laptel* about half-past three, and I immediately set to work to restore the barometer, the tube of which had its top knocked off on the pass by a jerk in taking it out of its leather case. I had taken a spare tube already filled in case of accidents, so I soon got this into its place, and I had no more disasters afterwards. The indications of this barometer were corrected by comparisons subsequently made with barometers that had been left at Milam.

September 6. *Laptel to Shangcha, 4 miles.*—As we wished to let our Huniya friend get a little ahead of us, we made a short march to-day. This was also otherwise desirable to enable us to get over the *Balch* pass, which was now before us, early on the following day before the wind got up. The route the whole way lay over undulating easy ground, often on the black shale, and it was throughout fairly covered with vegetation. Almost the only shrubby plants were **Potentilla fruticosa*, of which there are several well-marked varieties, a *Lonicera*, and the *Caragana*, all of which were common enough, growing perhaps to 2½ feet high, but not more; and the bright blue *Delphinium cæruleum*, another characteristic Tibetan form, began to be conspicuous.

In many places, strewed on the surface of the ground, are seen fragments of ammonites and belemnites, more particularly the latter, which are at times seen in great masses composing almost the whole substance of the rock. Portions of these same Jurassic beds we afterwards found on the very summit of the Lakhur pass, at a height of 18,400 feet.

Shangcha, 14,800 feet, where we halted, is on a stream that flows from the *Balch* pass, past Laptel. It is a flat-bottomed narrow ravine, with nothing remarkable in it. The rocks here again become much harder and more craggy, and gave indications of having suffered alteration by the intrusion of the greenstones and porphyries seen in the vicinity. I found no fossils in these strata, and they have perhaps been obliterated. In this sheltered ravine the vegetation was still cheerful, and, in addition to the plants before noticed, we observed *Campanula aristata*, and several European or Siberian forms of Ranunculus and Potentilla that are very common in Tibet; e.g. *R. pulchellus* and *hyperboreus*, as well as *P. multifida*, *sericea*, and **anserina*. The fern * *Cystopteris fragilis*, the only one of these regions, was also seen in cracks in the rocks.

On one of the hills above, as we went along, we saw for the first time three or four of the wild asses, *Asinus* or *Equus Kiang*, Tib. "Kyang." These animals are so common in the open plain of Guge, that the landscape is hardly complete without one. An attempt of our friend Bachu to get near enough to them for a shot proved futile on this occasion, as on every other during our expedition. He was, however, more fortunate in his attentions to two wild sheep, *Ovis Burrhel*, or *Nahura*, Hind. *Barhal*, Tib. *Sna*, which he managed to bring down; though a third, which was discovered later in the evening on the cliffs over our heads, managed to escape in spite of the scientific stalking of our Bhotiya sportsman, whose operations we watched in inglorious ease, sitting in front of our tent.

Having secured the skins of the barhal, our retainers made a more serious attack on the remains of the slaughtered sheep, concluding their operations with a manufacture of sausages, the details of which may be left to the imagination of the reader. A fine warm evening ushered in a feast which made grand havoc with the game, though our *chef de cuisine* providently reserved certain legs and loins for our special consumption, and we found the barhal, though cooked *à la Bhotiya*, very good.

My friend Mr. W., who had been somewhat upset by the effects of the cold on *Unta-dhura*, was still suffering a little; but matters were clearly mending, and our anticipations of better luck were not doomed to be disappointed. The thermometer at 9 p.m. was 36°·7.

September 7. *Shangcha to Tisum*, 13 *miles*.—As it was always necessary for us to eat our morning meal before we started, we never got off much before eight o'clock. To-day we began to ascend almost immediately over a steep mountain face, if possible more than usually barren, and we reached the summit of *Balch* pass a little before ten o'clock. In the stream of *Shangcha* I had seen a good many pebbles of greenstone, and I was therefore not surprised to find this rock soon appear *in situ*. It forms, indeed, the summit of the *Balch* ridge, the peaks of which rise, as I have said, to upwards of 18,000 feet. The rocks through which these eruptive rocks are intruded are of Cretaceous age. There were a few patches of snow lying about, but this range hardly comes within the limits of perpetual snow. Phænogamous vegetation exists to the very summit, within a few feet of which we found a pretty little composite plant (*Allardia tomentosa*), growing freely on the rock on which I hung up the barometer. Here also we found two species of Saussurea, so numerous at these elevations, *S. Hookeri* and *bracteata*, *Nepeta longibracteata*, and *Arenaria musciformis*. The wind was already blowing too hard to permit of a halt on the actual crest of the pass. On the rocks exposed to the south were very curious incrustations of ice, icicles indeed, but standing out horizontally like fingers towards the wind. I was not able to understand how they were caused, nor can I tell why they were confined to particular spots. The thermometer stood at 41°, and though the dew-point at the time would probably have been below 32°, and the cold produced by evaporation sufficient therefore to freeze water, yet it is evident that no condensation could ever take place simultaneously with the evaporation. I am afraid that I did not pay sufficient attention to the facts of the case at the time to be able to say more about this apparent puzzle, but I think that I afterwards saw something of the same sort on beds of snow under *Unta-dhura* pass and on the *Milam* glacier. The circumstances of these icicles being noticed by Captain Weller on the *Balch* pass several years before my visit, shows that they are not the result of mere accident. [It has since occurred to me that these icicles were caused by radiation. I found subsequently, in a somewhat similar position, that a thermometer suspended vertically, and simply exposed to the sky in front of it, was depressed as much as 20° Fahr. below the true temperature of the surrounding air. This result was, of course, due to the radiation through the extremely dry and rarefied atmosphere at the great elevation at which the thermometer was exposed. As radiation takes place freely from a surface of ice, the growth of such icicles as those described might be due to the condensation of vapour brought up by the southerly day winds that so constantly blow over these passes, and its accumulation in the form of ice on the exposed extremity of the icicle, the temperature of which might thus have been greatly reduced.]

From the *Balch* pass, 17,490 feet, we looked down over the part of Tibet we were about to enter. The view was somewhat restricted by the projecting points of the mountains on which we stood, and the distance was obscured by clouds, but we naturally looked with great interest at what lay before us. The plain of *Guge*, which we afterwards found to be, as indeed we had expected, much more extensive than it appeared from this point of view, was so much broken up by small ranges of hill and ravines as not to be very striking as a plain, and though its general barren, brown, and red tints certainly looked warm and comfortable from the pass, where we were shivering with cold, they did not otherwise give promise of much either in a botanical or picturesque point of view. A distant line of blue

mountains having an ordinary serrated outline, and a confusion of clouds over them, with very few snowy peaks visible, looked on the whole rather commonplace. It will be seen, however, from the map, that our position was particularly unfavourable for a general view of the country—such, for instance, as I afterwards had from the top of *Lanjar* peak, near the Niti pass.

On the descent, within 500 feet of the summit, or at an elevation of about 17,000 feet, the vegetation had reappeared pretty freely, and by the side of a small stream, which to the north of the Indian watershed is an essential for any approach to vigorous vegetation, we found several new plants. A large flowered gentian, *G. nubigena*; *Draba lasiophylla*, a form closely allied to *D. stellata* of the Alps; three or four species of *Pedicularis*, *P. versicolor*, *rhinanthoides*, and *cheilanthifolia*; some grasses, including *Avena subspicata* and *Deschampsia cæspitosa*, and *Carex ustulata*.

Having reached the *Jankum* river, which lies at the foot of the descent, we crossed it, and, ascending its steep bank, at length emerged upon the plain of *Guge*.

PLAIN OF GUGE, IN WESTERN TIBET, 15,000 TO 16,000 FEET.

The margin of the plain immediately in contact with the outer ranges which constitute the Indian watershed is about 16,500 feet above the sea, and was hence sufficiently elevated above the central parts, which perhaps average 15,000 feet, to enable us to see well over the whole surface. We now, too, caught a partial glimpse of the great snowy peak of *Kailas*, which rises to a height of very nearly 22,000 feet. Heavy clouds were hanging over the distant ranges, and here and there rain was seen to be falling. The sunshine and dark shadows intermixed made it difficult to seize upon the arrangements of the ridges, or to judge of their distances. The plain appeared to be perfectly flat and open for nearly 10 miles to the north, with small ranges of hill here and there rising sharply from it, while it ended abruptly on the south on the flanks of the mountains under which we stood. The *Jankum* river ran straight before us, cutting out a huge furrow from the plain, nearly in a direct line, its sides sloping at an angle of about 45°, and almost as even as a railway cutting. Other smaller ravines were seen to originate near us, and deepening as they went at length to unite with the larger one just mentioned.

Down one of these our road led us, and, following its course, we at length reached a halting-ground called *Tisum*, near the junction of the *Chaldu* ravine with that of *Jankum*. It had been intended that we should halt on the *Mamin* ravine before reaching that of *Chaldu*, but there was no water in it, so we had to go on.

The sections of the plain here made by these ravines, to a depth of 200 or 300 feet, showed that it was a great deposit of gravel or boulders, the magnitude of the stones varying from a moderate-sized boulder, a foot or two in diameter, to fine sand. The beds were laid out horizontally, or rather parallel to the surface of the ground, for the plain has a strong fall towards the *Satlaj*. The surface was generally very even, the stones being, with few exceptions, embedded in the soil, which was everywhere scored over with depressions, something similar to those seen on mud when drying, but less definite, probably arising from the draining off of the water as the snow, with which the surface must be covered in the winter, melts away. Stunted bushes of *Caragana*, the *Dama* of the Bhotiyas, or *Trama* of Tibet, and tufts of the half-shrubby *Eurotia ceratoides* hardly exceeding a foot in height, were sparingly scattered over the ground, mixed with a few grasses, Artemisia, Allium, Larkspur, and Potentilla; but I estimated that not one-tenth of the surface was covered by these plants near the Himalaya, where the vegetation was most vigorous, while further on the proportion did not probably exceed one-twentieth. The alluvial plain, indeed, is nearly an absolute desert, and it is only near the streams at the bottom of the ravines that habitations are to be met with. The footprints and other signs of the *Kyang* are to be seen in greater or less abundance on all parts of this plain, and it is possible that these animals are more numerous here in spring, for at the time of our visit there was hardly anything for them either to eat or drink. In one or two places we saw their bones lying in the ravines, to the seclusion of which, I suppose, they had retired to perish.

Tisum is the name applied to three halting-places, within a mile or so of one another, near the junctions of the *Jankum*, *Mamin*, and *Chaldu* ravines, and we were told by our Bhotiyas that it was derived from the two words of the Hindu and Tibetan languages, both of which mean "three," viz. *ti* and *sum*. A more probable etymology, however, is that the name is a compound of *ti*, which in the Kunaori-Tibetan dialect means "river," and *sum*, meaning "three." But all such etymologies may be looked on with suspicion. It should, however, be said that *sum-do* is the regular Tibetan term for a junction of two ravines where a flat space suitable for villages or encamping is usually met with, and it will be seen that this word also has *sum* or "three" in it, no doubt from the three portions of alluvial ground at the junction of two streams.

At 9 p.m. the thermometer was no lower than 45°, though *Tisum* is 14,690 feet above the sea; but the night was cloudy.

(*To be continued.*)

THE LIVINGSTONE EXHIBITION.

Under this name, Dr. Harford Battersby, of the Livingstone Missionary College, organized an exhibition of travellers' equipments and health requisites in the St. Martin's Town Hall, which was open to the public from January 1 to January 5. The exhibition was divided into two parts, the first consisting of relics of Dr. Livingstone and of other travellers, and the second of trade exhibits shown by some of the leading equipment and food-preserving firms.

The Livingstone relics included a bust and portraits of Livingstone, two of his original MS. maps, his sextant and photographs of the tree under which his heart was buried, lent by the Royal Geographical Society. Mr. Frank Wilson, son-in-law of the explorer, showed a very interesting series of books, including the journals written in notebooks, on the edges cut off pamphlets, and on pieces of newspaper. He showed also the watch, drawing-instruments, binoculars, and firearms carried by Dr. Livingstone, as well as other objects associated with his work and expressive of the recognition it received at home. Perhaps the most interesting of all was the cast of the broken and mis-set humerus by which the body, when it was brought to this country, was proved to be that of David Livingstone.

Mr. W. H. George, son of the late map-curator of the Royal Geographical Society, Mrs. Horace Waller, and others also contributed photographs, portraits, models and other relics.

On the evening of Tuesday, January 2, the exhibition was reserved exclusively for Fellows of the Royal Geographical Society and their friends, who were received by Sir George Taubman Goldie, Vice-President of the Society. Mr. Frank Wilson gave a short address, illustrated by the appliances to which he referred, showing how vastly all kinds of travellers' equipment have been improved since the journeys of Livingstone.

The second part of the exhibition contained specimens of tents, portable boats, firearms, travellers' clothing and boots exhibited by S. W. Silver & Co., the Military Equipment Company, the Jaeger Company, the Berthon Boat Company, and J. Tucker. Portable foods were shown in great variety, special features being the prepared meat-rations of the Nao and Bovril companies. Much interest was shown in the exhibit by the British Preserving Company, of Rayne, Essex, of desiccated vegetables prepared in an absolutely dry form without preservative or colouring matters, which only require to be soaked in water to assume the appearance, colour, and characteristic smell of fresh vegetables or fruit. A great variety of medicines in forms specially adapted for portability and resistance to bad climates were shown by Burroughs, Wellcome & Co., Allen & Hanbury, Howards & Son, Oppenheimer, Sons & Co., T. Howard Lloyd & Co., and others. Many of the methods of preparation are extremely ingenious. Filters, cooking appliances, etc., were shown in considerable variety. Some exhibits appeared to have little connection with travel or travellers, *e.g.* babies' clothes, but such were merely exceptions to an otherwise excellent and practical exhibition. There was, however, a very remarkable want of a kind little creditable to firms which rely doubly on travellers; this was the total absence of maps, charts, or books of travel or geography. Smith, Elder & Co. showed some books on medical travel, but that was all. How very different the department entitled "Literary and Educational" would appear in a similar exhibition held in Germany!

A series of lectures was arranged to explain and to be illustrated by the exhibition. These were given by Dr. Harry Guinness, on "South America;" by Mr. W. Wilway, on "Health Precautions in Cold Climates;" by Major Ross, I.M.S., on "The Malarial Mosquito;" by Miss Mary Kingsley, on "West Africa;" and by Dr. Harford-Battersby, on "The Preservation of Health in the Tropics."

THE MONTHLY RECORD.

EUROPE.

Geography of Europe.—In the latest volume of the new issue of Stanford's Compendium, Mr. G. G. Chisholm treats of the southern, central and eastern countries of Europe,* the whole forming a practically new work, constructed on a new plan, and almost entirely rewritten. After a general introduction on the geography of Europe as a whole, the countries are taken up in the order of the Mediterranean peninsulas, Central Europe, and finally Eastern Europe. The treatment of Italy is very full, and is so planned as to form a key to the whole geography of Europe from the historic side. In dealing with the other Mediterranean countries, Mr. Chisholm is assisted by Mr. J. T. Bealby. There are over a hundred illustrations, chiefly views of towns and scenery, and a complete equipment of maps, including the orography, rainfall, geology, and ethnography of Europe. The geological map is, we believe, the first to show the whole of Europe with the formations coloured in accordance with the rules drawn up by the International Geological Congress, for their large-scale map of the continent. The second volume will contain descriptions of the United Kingdom, Scandinavia, Holland, and Belgium.

The Biological Geography of Europe.—Dr. Robert Scharff has been kind enough to supply us with the following synopsis of the contents of his newly published book, 'The History of the European Fauna.'† When we examine the composition of the British fauna, we find that the native element is very inconspicuous. The general range of the majority of the British species clearly indicates that they have migrated to the British Isles from the continent of Europe, most of our familiar forms of animal life occurring there also. A few of these may possibly have found their way to these islands in an accidental manner across the sea, but the main mass of the fauna must have travelled in the normal mode by land when the channel between England and France did not exist. As a rule, species are known to be grouped round certain centres, near which the genus probably originated, and we can thus approximately ascertain the original homes of the component elements of our fauna. The former history of mammals and mollusca is revealed to us to some extent by the remains which we find preserved in our geological strata, while other groups of animals have left few fossil traces. By carefully mapping out the geographical range of the British species of animals and taking into consideration their past distribution, it is possible in a number of cases to discover the direction from which their migration took place. There are species which have undoubtedly come to us from the north, which form part of what we might call an arctic migration. Another group of species came from Siberia and across Central Europe, and these are members of the Siberian migration. And we have, besides, animals which originated in the Alps and in South-Western and also in Eastern Europe and in Southern Asia. The late Edward Forbes was the first to apply such methods of analysis in tracing the history of our fauna, and to demonstrate the great importance of the study of zoogeography. He held that the south-western or Lusitanian element of

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* 'Stanford's Compendium of Geography and Travel' (new issue)—Europe. Vol. i. By Geo. G. Chisholm. London: E. Stanford. 1899.

† 'The History of the European Fauna.' By R. F. Scharff, B.SC., PH.D. With illustrations. The Contemporary Science Series. London: Walter Scott, Limited. 1899.

our fauna was the oldest, and that the eastern, Teutonic, or Siberian was the newest. Discontinuity in the range of a species, as Darwin has taught us, is always a sign of antiquity, and many of the Lusitanian species no doubt exhibit such a distribution. The general distribution of the different elements of the British fauna, moreover, proves that Forbes was quite correct in his estimate. Now, if we would ascertain precisely the geological age of any of the various migrations which entered the British Islands, the relative age of the others could thus be fixed. As we should expect, the most modern of the migrations has left the most satisfactory fossil traces. We can actually follow the former migrations of many of the species right across Europe from their native home in Eastern Europe or in Siberia. A number of characteristic Eastern forms make their first appearance in England in the Forest-bed deposit, whilst in Germany and Russia their remains occur only in beds overlying the lower boulder clay. These continental beds are believed to have been deposited during an inter-glacial stage of the Glacial period, and their fauna would indicate that they are contemporaneous with the Forest-bed. The subjects just alluded to are fully discussed in the book. Then follows an account of the nature and history of the Siberian fauna—the former occurrence of southern species in the New Siberian islands—and the origin of the Caspian fauna, and these studies incidentally lead to the belief that a comparatively mild but damp climate must have prevailed in Europe and Asia during the greater part of the Glacial period. Under these circumstances an enormous northern *mer-de-glace* could not have existed. The old Lyellian theory of the marine origin of the boulder clay thus finds confirmation, and this hypothesis explains many anomalies of distribution which would otherwise remain inexplicable. According to the reconstruction of the ancient geography (maps of which are given in the book), Scandinavia continued northward as far as Greenland, and southward to Scotland, whilst England was connected with France at the beginning of the Glacial period. A submergence of the northern plains of Russia and Germany—*i.e.* a transgression, in the sense of Suess—took place, so that a continuous sea existed between the White sea and the east coast of England, which, however, did not communicate with the Atlantic. The composition of the Scandinavian fauna indicates that that country was isolated from continental influences for a considerable time. The occurrence of marine species in fresh-water lakes in Northern Europe seems to support the view that not long ago the latter was covered by the ocean. It is also demonstrated clearly that the fauna of the Alps is not due to the Siberian migrants having retired to the mountains from the plain after the Glacial period, but that it is mainly of Central and Southern Asiatic origin. It must have survived the Glacial period on the Alps themselves, even though, no doubt, extensive glaciers spread beyond the lower outliers of that great mountain chain. The conclusion arrived at as to the origin of the Alpine fauna thus supports the view as to the temperate character of the climate during the Glacial period, and the survival of a considerable proportion of our pre-glacial animals in all parts of Europe in those areas in which they had previously established themselves.

Recent Researches at the "Karlseisfeld" (Dachstein).—Baron von Hübl, director of the technical section of the Austrian Military Geographical Institute, has during the past summer carried out a series of measurements, effected by the aid of photography, of the famous "Karlseisfeld" glacier in the Alps of Upper Austria, the scene of Friedrich Simony's classic labours. The results are most satisfactory, and will be utilized for the construction of a minutely detailed map of the glacier, the scale of which will be 1 : 10,000 (that of Finsterwalder's map of the Vernagt glacier), or even larger. Simultaneously with this new survey, which is intended to supplement and rectify that published in 1897 by Colonel

von Groller, investigations have been made by Dr. August von Böhm into the glacial phenomena of the region, particularly the moraines and the periods of advance and retreat of the glacier.

Dr. Karl Oestreich's Explorations in Macedonia.—Dr. Karl Oestreich, whose investigations in 1898 in the north-west of European Turkey have already been described in the *Journal*, has since continued his work, during the summer of 1899, by a scientific examination of parts of Macedonia. Writing to the Berlin Geographical Society in August and September last (*Verhandlungen*, 1899, Nos. 8 and 9), he briefly describes the chief results of his journeys, which, he says, show that even the best geological maps of the region in question must be superseded. Dr. Oestreich reached Monastir by way of Üsküb, and the principal result of the journey between those places was the discovery of a limestone range with patches of *névé* (in July), "karen," and lakes. From Monastir he made an expedition to Lakes Ochrida and Prespa, which resulted in considerable additions to our knowledge of the geology of their neighbourhood. The whole of Lake Ochrida lies in a limestone area, and the same is the case with the Western and Southern portions of Prespa, *i.e.* the west coast and the two southern bays. The character of the country round these parts of the lake resembles that of the Dalmatian islands, while the lake itself is of the nature of a "karst" lake. Dr. Oestreich found on the cliffs marks of three different water-levels, at intervals of one or two feet. He thinks that these point to a continued, as well as a periodic, sinking of the water—the latter possibly seasonal—although the natives assured him that the level was constant. From the fishermen he learnt that the greatest depth is forty times the span of the outstretched arms in the northern basin, twenty times in the south-west bay, and five to seven times in that towards the south-east. This last is now cut off from the rest of the lake by a neck of land, and has no outlet, though an almost level valley—the site of a former outflow or inflow—leads from its upper end to the Devol plain. The most remarkable discovery, however, was a subterranean outlet of the lake near Han Gorica on its west shore, the water running in a full stream into the limestone, which dips to the west-north-west. Whether or no it falls into Lake Ochrida cannot be determined. Among other features of interest examined was the solfatara of Kozel, near Ochrida, which gave the smell and other signs of sulphur. During the latter part of the journey Dr. Oestreich passed through entirely new ground on the way from Vodena over the mountains to Gjevgelii on the Üsküb-Salonica railway, and here too made some interesting geological discoveries, including that of *Hippuritidæ* on the declivity of the Kaimakcalan towards the plain of the Moglena. The Murichovo, the region of the gorge of the Crna, is a volcanic tableland, while mountains of over 6500 feet altitude round its margin are also composed of volcanic rocks.

Limans of the Black Sea.—The Odessa University undertook several years since a detailed exploration of the limans, or salt lakes, situated close to the sea-coast in the neighbourhood of Odessa. The results of a detailed exploration of the Kuyalnik liman are now given in the *Memoirs of the Novorossian (Odessa) Society of Naturalists* at the University, vol. xxii. 2. The topographical part is by A. Wassilieff, and represents a volume of 300 pages, with a most detailed large map of the liman, with its depths, on the scale of 1: 16,800, which will be a valuable document for all later exploration of the same liman, and a series of profiles. The astronomical and topographical work is given in great detail. Together with the previously published work of A. Lebedintseff and V. Krzyzanowski (same Memoirs) and the work of N. Sokoloff, 'On the Origin of Limans in South Russia,' which contains a full bibliography of the Limans (*Memoirs of the Geological Committee*, vol. ix. 4), we have now valuable material for

physico-geographical considerations relative to the origin and life of these interesting formations. The same volume contains also a paper on the bacteria which are found in the mud of the same liman, by L. Silberberger and M. Weinberg.

The Eichener See in the Black Forest.—In a note in *Globus* (vol. lxxvii. p. 20), Dr. Halbfass summarizes an article by Herr Knierer in the publication of the Baden Schwarzwaldverein on the subject of the Eichener See, a remarkable periodic lake near Schopfheim in the south of the Black Forest. The lake makes its appearance sometimes at intervals of several years, at others several times in the same year. At the last high-water period, in 1882–83, it reached a depth of 11½ feet, and persons have more than once been drowned in it. The lake owes its origin to the swelling of underground watercourses which traverse the "Muschelkalk." High level is reached only when some weeks have elapsed after the fall of heavy rain. Dr. Halbfass urges the importance of exact observations extending over a considerable space of time.

ASIA.

Exploration in Northern Asia Minor.—Between September and November of last year a scientific journey was carried out by Dr. Richard Leonhard of Breslau, through some of the less-known parts of Northern Asia Minor between Angora and Eregli—the ancient Galatia and Bithynia. Dr. Leonhard's work was hampered by the amount of rain and mist which prevailed, but in spite of this he succeeded in climbing the culminating point of the Ala-dagh, the highest range of the northern part of the peninsula, and also in crossing the Bithynian chains to the shores of the Black sea. The latter journey was accomplished in the face of unusual difficulties.

Dr. Karl Lehmann's Visit to Armenia.—We learn from the *Geographische Zeitschrift* (1899, p. 708) that Dr. Karl Lehmann has lately returned from a visit to Armenia in company with Dr. Belck, which occupied eighteen months. The objects of the journey were mainly antiquarian and ethnological, but results of value to geography have been obtained by the determination of a series of altitudes. The inscriptions brought back are said to throw a flood of light on the history of the old North Chaldæan empire. Linguistic traces of the Chaldæans could not be found, but are most probably to be looked for in the country behind Trebizond. The rock-dwellings examined by Dr. Lehmann are, however, in many cases probably to be referred to the time of the Chaldæans, if not to a still earlier date.

Shrinking of the Dead Sea.—According to a note in the *Deutsches Rundschau*, the water of the Dead Sea has lately undergone a marked diminution in volume, mainly, it is said, owing to the increased diversion of the water of the Jordan for irrigation purposes. The bed of the lake is said now to appear like a deposit of dry salt.

Return of the Danish Pamir Expedition.—The return to Copenhagen of Lieut. Olufsen, who for the greater part of two years has been engaged on an expedition to the Pamirs, has recently been announced. During the past summer the expedition, which, as already recorded in the *Journal*, left its winter quarters on March 1, appears to have continued its work in the southern borders of the Pamirs, returning home by way of Khiva, Resht, and Teheran. Important results in the field of cartography, ethnology, and natural history are said to have been attained.

The Count de Barthélemy's Latest Journeys in Annam.—The Count de Barthélemy, who during the last few years has made various journeys of exploration in French Indo-China, in 1898–99 carried out an expedition through

the mountainous region of the Mois to the south of Hue, which is described in the third part of the *Bulletin* of the Paris Geographical Society for 1899. The term Moi is a collective one, signifying the primitive inhabitants of a district hitherto little explored, who differ much among themselves both in race and language. M. de Barthélemy, with two European companions, made a preliminary trip from Hue southward to the Song-kai river, passing through a number of Moi villages between the basin of the Hue river and the Song-kai. As far as the streams are navigable by *sampans* the villages are inhabited by Annamites, but beyond the limit of navigation the Moi districts begin. The Annamites, who are very active as small traders, carry on some intercourse with the latter. The Moi houses are poor but lofty, and there is a common building in the centre of the village for the reception of strangers. The journey was rendered difficult by constant rain and the badness of the tracks, but at last the first French settlement towards the Song-kai, An-dien, was reached, and the travellers proceeded down the coast for a more important tour in the Moi countries further south. The starting-point was now Tra-mi, celebrated for the trade in cinnamon carried on with the Mois. This trade, in spite of all the efforts of the authorities, remains entirely in the hands of the Chinese of Fai-fu. The first Moi tribe encountered was that of the Daviats, distinguished by their narrow almond-shaped eyes. They are more wild and war-like than the Mois first seen, and their villages are strongly stockaded. Reaching the basin of the Song-trakuk, the travellers found that this was incorrectly shown on the map of M. Pavie, extending further to the west. The watershed towards the Mekong was crossed at an altitude of 5250 feet, heights of 6500 feet being observed in the neighbourhood. The Krong-bla was then followed southwards through the country of the Sedangs—taller and stronger than the Daviats, but dwelling in unfortified villages, well hidden in the woods. In the neighbourhood of Kon-Tan, the point of divergence of several routes into the Laos country, the Bla enters a fine, well-cultivated valley. Proceeding down-stream, the travellers reached the Catholic Mission among the Banars, and their further route was south-west through well-known country to Binh-dinh.

The Lukchun Depression.—It will be remembered that when the brothers Grum-Grzimailo discovered in 1890 the remarkable depression of Lukchun in the midst of Central Asia, the Russian Geographical Society asked Roborovsky to carefully explore this depression during his last journey. Accordingly, Roborovsky established at Lukchun a permanent meteorological observatory, at which observations of the meteorological instruments were carefully made for two years in succession, from November 1, 1893, to October 18, 1895. The station was situated 2½ miles east of Lukchun town, and was visited in September, 1894, by Obrucheff. Now, General Tillo gives in the *Izvestia* of the Russian Geographical Society (1899, 1), a full analysis of the results of these important observations. The nearest meteorological stations, the altitudes of which are known from levellings, are unfortunately only Barnaul (Altai) and Irkutsk—the altitude of which last still remains doubtful to some extent. Consequently, there is no means of obtaining an absolutely reliable altitude of Lukchun. However, from three series of comparisons of the two years' barometrical observations made at Lukchun with the observations at Barnaul and Irkutsk, as well as with the isobars of Hann, Buchan, and Tillo, it appears that the altitude of the Lukchun station must be 17 metres (56 feet) below the sea-level, with a possible error of ± 15 metres (50 feet). A careful levelling of the whole of the Lukchun depression having been made (a map of it, 13 miles to the inch, is given with Tillo's paper), it appears that its lowest spots are from 95 to 112 metres below the meteorological station; so that the altitudes of these spots are −112 metres, or −368 feet below the sea-level

at Bojantetura, and as much as —130 metres (428 feet) at Tash-tura. Besides, the meteorological observations made at Lukchun are highly interesting in themselves. The difference between the monthly averages of the barometer in January and July is greater at Lukchun than at any other spot known on the earth; it attains full 30 millimetres. In December, January, and February, the maximum of barometric pressure is in the middle parts of the continent of Asia. The daily range of the barometer in these regions of maximum pressure is as great as in several tropical lands. The temperature of the summer months is also very high, and is the same as in the Sahara. The maximum temperature observed (48° C. or 118° F., and 64° C. or 147° F. in the sun) is also a maximum one, while the dryness of the air and the absence of rain in the Lukchun depression are also excessive.

AFRICA.

Surveys of the Bonchamps Mission.—We learn from the *Politique Coloniale* for December 19 last that a large-scale map (1 : 200,000), in fourteen sheets, of the regions traversed by the Bonchamps Mission in South-West Abyssinia, has been constructed by M. Charles Michel, the second in command. This map will, it is said, constitute the most important authority on the geography of the little-known regions with which it deals. Since his return to France, M. Michel has devoted all his time to working up the large amount of material brought back by the expedition. This includes, among other collections, a large number of specimens illustrating the insects of the country traversed, no fewer than thirty having been previously unknown to science. Drawings of these, prepared by M. Michel, will eventually be published.

The French in the Northern Sahara.—Recent news shows that French activity in the Sahara, south of Algeria, has now entered upon a new phase. Although travellers of that nation have for many years devoted their attention to those regions, which since 1890 have been formally acknowledged as a French sphere of influence, the definite establishment of sovereignty has not hitherto been effected beyond the outpost of El Golea, on the great southern road to Insalah and the Tuat oases. The extension of French influence over the latter has long been only a question of time, for, although some vague claims were once made by Marocco to the Tuat oases, these were quite unsupported by the actual exercise of sovereignty, and have been virtually abandoned for some years past. The way has lately been prepared for a definite advance by the work of various French travellers and officers in the Insalah region, who have executed important surveys, and introduced many corrections into our maps. Among these, M. Flamand, who in 1896 undertook a mission to Gurara, and Captains Germain and Laperrine, who more recently surveyed the route from Fort Macmahon to Insalah, deserve special mention. The present Governor-General of Algeria, M. Laferrière, has been a zealous advocate of a forward policy, which, it is said, has now been definitely decided on by the French Government. M. Laferrière's views have been clearly expounded in the *Revue Française* (1899, p. 205; 1900, p. 11). He has shown the importance of affording protection to the tribes friendly to France against their more obstructive neighbours by the military occupation of Tuat, which would also have the beneficial result of permitting the extension to that district of the railway now under construction to Jenien-bu-Resg. According to the latest reports, the occupation of Insalah has not been effected without opposition, and fighting has taken place around that centre. M. Flamand's name has been mentioned in connection with recent operations, although according to earlier information that traveller, who left Wargla for the south in November last, was entrusted rather with a scientific than a political mission, the task committed to him by the Minister of Public Instruction being the

study of the geology, botany, and hydrography of the region, as well as of the state of religious affairs among the sects of the Algerian Sahara. It may be remarked that the name Tuat, which is the general Berber word for "oasis," and is sometimes used for the whole group of oases south of Algeria, including Insalah, is applied in the narrower sense to the line of oases running north and south from the neighbourhood of Gurara to about 26½° N., the most important lying a few miles to the east of the course of the Wed Mzaud. The population, which includes a diversity of ethnical elements (Berber, Arab, Negro, etc.), is very dense, the separate "ksur," or settlements, adjoining each other very closely, and numbering over 300. The soil of the district is formed in great part of recent alluvium, extending round the base of the cretaceous Tademait plateau, and to this fact it owes its fertility. The importance of the locality, however, depends in great measure on its central position among the surrounding countries, which has made it a great emporium of trade. To the French it is of value as forming an advanced outpost in the direction of Timbuktu, and thus facilitating communication across the desert with that much-sought goal.

Dr. Kandt's Surveys in the Lake Kivu Region.—The fourth number of the *Mitteilungen aus den Deutschen Schutzgebieten* for 1899 contains a short report by Dr. Kandt on his work around Lake Kivu, to which allusion was made by Mr. Sharp in his recent communication to the Society (*Journal*, vol. xiv. p. 662). A sketch-map is also given of the lake, which shows how incorrectly it has hitherto been shown on our maps. Dr. Kandt wrote from his zoological station on Lake Kivu in August last. In December, 1898, he had started up the valley of Rusizi, and on reaching its outflow from the lake, crossed to its right bank, and followed the western shore of Kivu through Bunyabungu, Itambi, and Uyungu, to Kumasa at its northern point. Thence he proceeded north through various independent districts to within two days' march of Lake Albert Edward, afterwards turning south-east along the floor of the great trough to Kissigali, a district of Ruanda. Thence following a former route along the foot of the Sabyin volcano, he struck Lake Kivu at Kumisenye, and followed its eastern shore southward to the Rusizi. The southern end of the lake is split into two gulfs by a peninsula, and at the extremity of this Dr. Kandt established his station. The axis of the lake is shown by him as running north-east and south-west, the greater part of it lying much farther east than has been supposed. The long narrow island of Kwijwi, continuing the line of the southern peninsula, runs in a straight line up the centre. North of Namyagira (the north-western of the Virunga group of peaks, according to Von Götzen), the remains of an old lake-bed extend to Lake Albert Edward, forming at the present day a swamp with four minor lakes. Dr. Kandt carefully surveyed the greater part of the region between Kivu and Albert Edward, discovering a great lava-plain in the south between the volcanoes and the plateau escarpment. He hoped to be able to complete his work by descending the Akanyaru to its junction with the Nyavarongo, and thence going north of the Mohasi to the Virunga volcanoes, and back to Kivu by their south side. He has paid special attention to ornithology, but was purposing in his next trip to study the botany of the eastern lake-shore and of the forests of the plateau-escarpment.

Pendulum Observations in German East Africa.—A German expedition for the purpose of gravity determinations and the fixing of positions by astronomical observations left Langenburg in May last, under the command of Lieut. Glauning and Dr. Kohlschütter, the latter of whom took part in the Anglo-German boundary delimitation. Letters from the neighbourhood of Lake Rukwa, describing the early stages of the expedition, are published in the *Mitteilungen aus den Deutschen Schutzgebieten* (1899, part 4). From the mouth of the Songwe the party proceeded

north *viâ* Rungwe and the Ngurumbu pass, whence a descent was made to the Usafua plain. The new residence of Merere in the Usanga steppe was visited, and the journey continued westward across the Tangano range to the residence of Sultan Muambunyu (district Bungu or Wungu), on Lake Rukwa. Lieut. Glauning assigns a greater extent to the remnant of the lake than is allowed by Mr. Wallace, giving it a length of 80 kilometres (50 English miles), or even more; but this, perhaps, includes the swamp at the north end. He says that even in the south it has retreated almost 2 kilometres (over a mile) during the last ten years, though a greater difference is seen in the north, where it was shallower. Its dimensions do not change greatly in the rainy season. Dr. Fülleborn, who has navigated it in canoes, found the greatest depth to be from 7 to 10 feet. A pendulum station was established at Kamsamba between the lake and the southern escarpment, and here observations were made, while positions for three other stations were to be chosen on other sides of the lake. The expedition was afterwards to proceed to Tanganyika.

The Geology of the West Coast of the Victoria Nyanza.—A short paper by Captain Herrmann, in the *Mitteilungen aus den Deutschen Schutzgebieten* (1899, part 3), sums up clearly the chief structural features of the country west of the Victoria Nyanza. This region forms part of the great interlacustrine plateau, composed chiefly of quartzite and clay-slates, which rises to a considerable height above the granite and gneiss regions of German East Africa, its boundaries being marked on all sides by a steep drop of from 350 to 1350 feet. The lower layers (whose deposit, however, dates, in Captain Herrmann's opinion, from a period when the granite region to the south was already dry land) consist of a great variety of clay-slates, etc., from a snow-white kaolin to the hardest black roofing-slates, the separate layers being generally thin. Above this series originally lay the quartzite, in fewer but thicker layers, also varying greatly in structure and hardness, some being in homogeneous blocks, others showing a pillar-like structure. The period of the elevation of these formations was probably that which gave rise to the whole system of terraces, troughs, and volcanoes in this part of Africa. The movements of upheaval must have everywhere acted in the same direction, the structural lines always running from north-north-east to south-south-west. The force exerted varied, however, in intensity according to the distance from a central point, which seems to coincide with the volcano Virunga. It remained, however, the same within successive zones slightly curved round this centre. The result is a succession of blocks separated by troughs, of which Captain Herrmann defines five. The first from the east is formed by the islands off the west coast of the Victoria Nyanza, which are all connected beneath the water-level, but are separated from the mainland by a channel of equal depth throughout. Three other blocks, separated by river-valleys, swamps, or lines of lakes, occur before the Kagera is reached; while the fifth—Ruanda—lies to the west of that river. These main divisions have exercised an influence on the political partition of the country among the native tribes. Although the action of running water has, to some extent, modified the relief, the edges of the blocks are still so sharp, that this can have operated only from a geologically recent period. Captain Herrmann concludes by a reference to the three different changes of level—secular, periodic, and yearly—which affect the Victoria lake. The second seems to have a period of from eighteen to twenty-five years, and possibly coincides with fluctuations in the rainfall. In former times the present troughs, such as the Kagera valley, were arms of the lake; while, as the secular retreat of the water proceeds, that between the islands and the shore now covered by water will also form a valley, while the eastern edge of the islands will form the coast-line.

Moir's Lake in Northern Rhodesia.—Mr. Robert Codrington sends us the

account of a recent visit to Moir's lake, by Mr. P. H. Selby, collector of the Loangwa district of Northern Rhodesia. The lake, which lies to the west of the Middle Loangwa, was first seen by Mr. Joseph Thomson, during his outward march in 1890 towards Lake Bangweulu. Mr. Selby reached it by climbing the escarpment of the Muchinga range and crossing the level plateau above, of which the lake is merely a flooded depression. The surface of the plateau is dotted here and there with huge monoliths, covered with lichen. The timber is low, the grass short, and strong-running streams occur every few miles. Some thirty or forty years ago the country, now entirely uninhabited, was densely populated with Wasenga, who retreated south-west owing to the depredations of the Angoni. The lake (known to the natives as Wemba) was apparently smaller than when visited by Thomson, as Mr. Selby says it is about 6 square miles in extent, whereas the former estimated it at 30. There are only two narrow strips of open water separated by a sandy belt covered with rushes, the rest of the lake being concealed by long thin grass growing from the bottom, while the ground all around is swampy. The average depth appears to be 2 or 3 feet. The water is fresh, and contains fish, but no hippo or crocodiles. In its neighbourhood there are only some forty or fifty huts of the poorest and wildest Wabisa.

AMERICA.

A Canadian Lake of Subterranean Inflow.—Mr. A. T. Drummond, in a recent letter to *Nature*, describes a curious lake in Canada specially characterized by its having an invisible inflow. The lake in question, named the Lake-on-the-Mountain, is situated on the top of a cliff about 180 feet in height, on the south side of the Bay of Quinte, an arm of Lake Ontario. It is described as a lake of clear fresh water, about 1½ mile long, with a width of about three-quarters of a mile. The source of the inflow is not, it seems, attributable to springs from any possibly higher grounds in the same country, but, in Mr. Drummond's opinion, rather to be sought in the Trenton limestone area 25 or 30 miles to the north-eastward of the Bay of Quinte. The dip of the rocks is favourable, and for the whole distance, and into the Laurentian area beyond, there is a steady rise towards the north until at about 50 miles away a height of nearly 400 feet above Lake Ontario is reached. A fair amount of rain fell in this higher country during the drought elsewhere. In order to ascertain their bearing on the origin of the inflow, Mr. Drummond this past summer took a series of depths and temperatures in the lake. Whilst a considerable part of its area was shallow, the lake was found to have, close alongside its southern boundary, a great rent in the bottom, nearly a mile long, one-third of a mile or more wide, and varying from 75 to 100 feet deep. This rent is probably due to a widened fault in the Trenton limestone here, and it is suggested that the same forces which gave rise to this fault may also account for a subterranean connection with higher ground many miles away. In Lake Ontario, at its outlet opposite Kingston, during August, the surface of the water ranged in temperature around 72° Fahr., and at a depth of 78 feet (the bottom) it was 56½° Fahr., the latter being very much colder than during last and some previous years. At the Lake-on-the-Mountain, whilst the temperature of the surface was 74½° Fahr., at 30 feet depth it was 69½° Fahr., at 45 feet 47° Fahr., at 60 feet 43° Fahr., and at 99 feet 42° Fahr. Thus, whilst during the first 30 feet there was not very much change in the temperature, between 30 feet and 45 feet there was a rapid fall of 22½°, and between the latter depth and the bottom at 99 feet a further fall of only 5°.

Southern Chile.*—Mr. W. Anderson Smith spent some time in southern

* 'Temperate Chile, a progressive Spain.' By W. Anderson Smith. London: A. & C. Black. 1899.

Chile in the years 1896 and 1897, studying the conditions of the districts in which colonization is now being carried on, the portion of the central valley south of Talca, the island of Chiloe and the small islands near it, and the lower reaches of the Palena river. The first part of his book deals with the social, political, and economic conditions of the Republic as a whole, the second and more important part with the actual conditions of the southern lands. He deals mainly with the various aspects of natural history in a popular manner, and he has much to say as to the history of south Chilean colonization and the present condition of the European settlers and native Indians. The remarkable density of the forests in the humid region is vividly described. The great shell-fish industry along the coast, and the vast abundance and slight utilization of the fish which swarm in sea and river, are strongly insisted on. It would appear that Mr. Smith made his observations with the assistance, if not indeed on behalf, of the Chilean Government, but his book is a frank statement of facts and opinions quite uninfluenced by any official control.

Geological Researches in the Andes.—The recently issued volume of the *Revista del Museo de la Plata* for 1899 contains several reports on geological investigations lately made in the Andes between Argentina and Chili. One of these, by Dr. Carl Burckhardt, deals with that part of the range just north of 39° south, embracing the upper basin of the Biobio. The most remarkable feature here to be noticed is the ramification of the Cordillera into three chains, including between them two "Inter-Andine plateaux." The easternmost chain forms a zone of Jurassic-Cretaceous rocks with simple folds. This is followed towards the west by the plateau of Las Lajas, a zone free from folding, covered with neo-volcanic rocks. Next comes the chain of Pino Hachado, forming a zone of Mesozoic folds with old volcanic rocks, surmounted by basalt, which last has been ejected subsequently to the folding of the Cordillera. The fourth zone consists of the plateau of the Rio Aluminé, again free from folding, formed of granite, and covered with neo-volcanic lavas; while the last two zones constitute the chain of Lonquimay, consisting of Jurassic folds, associated in the east with granite, and further west with basalts with eruptive centres. From the evidences of glaciation visible in the basalt which covers the Pino Hachado chain, it follows that the main folding of the Andes was completed before the close of the glacial era. Dr. Burckhardt holds that the Pino Hachado chain is closely related orographically and geologically with that of Lonquimay, and that the two form together the Cordillera, properly so-called, of the region. An interesting note is also given relative to a probable change, which has occurred within comparatively recent times, in the position of the continental water-parting in this latitude. It now runs through the Paso del Arco, and is formed by glacial moraines. Where these are discontinuous the surface is quite level, and is occupied by a marsh. In the valley of the Arco, which runs to the Atlantic, there are to be seen the ancient deposits of a large river, the rocks composing them being not found in the neighbourhood. In the valley of the Biobio there is a system of alluvial terraces, which show that that river once flowed some 600 to 1000 feet higher than at present, while the material of which they are composed is analogous to the deposits on the Arco. Dr. Burckhardt therefore concludes that the Biobio once flowed to the Atlantic through the valley of the Arco. The same volume of the *Revista* contains the report by Dr. Leo Wehrli on a geological expedition to the region of Lake Nahuel-huapi, which supplies the means of comparing the structure of the Andes in that latitude (40°–41°), with that observed by Dr. Burckhardt, and also with the phenomena previously noted by the two observers in 35°–36°. The region of the Biobio presents, as might be expected, intermediate characters between the two others. In the south Dr. Wehrli found the groundwork of the range to be a vast granitic massif, while the folded sedimentary formations are represented only by two narrow belts.

AUSTRALASIA AND OCEANIC ISLANDS.

Soundings by the "Albatross" in the Pacific Ocean.*—A letter dated "Papeete Harbour, Tahiti Island, September 30, 1899," giving particulars of the work accomplished by the *Albatross* expedition up to that time, has been received by the U.S. Fish Commission from Prof. Alexander Agassiz, and is published in *Science* of December 8, 1899. The expedition left San Francisco on August 23. The first sounding was made in lat. 31° 10′ N., and long. 125° W., in 1955 fathoms, about 320 miles from Point Conception, the nearest land. At station No. 2 the depth had increased to 2368 fathoms, the nearest land, Guadeloupe island, being about 450 miles, and Point Conception nearly 500 miles distant. The depth gradually increased until it reached 3088 fathoms in lat. 16° 38′ N., long. 130° 14′ W., the deepest sounding thus far obtained. Off the Marquesas, in lat. 7° 58′ S., long. 139° 8′ W., the depth became 2287 fathoms. It then passed to 1929, 1802, and 1040 fathoms, in lat. 8° 41′ S., long. 139° 46′ W., Nukuhiva island being about 30 miles distant. Between Nukuhiva and Houa-Houna (Ua-Huka) islands, 830 fathoms were registered, and 5 miles south of Nukuhiva 687 fathoms. About 9 miles south of the latter island a depth of 1284 fathoms was obtained. It would appear from the soundings that this part of the Marquesas rises from a plateau having a depth of 2000 fathoms, about 50 miles in width. The soundings were extended by the Paumotus as far as Tahiti, and in all numbered seventy-two. The deep basin in the Central Pacific developed by the soundings between lat. 24° 30′ N., and lat. 6° 25′ S., varying in depth from nearly 3100 to a little less than 2500 fathoms, is pointed out as being probably the western extension of a deep basin indicated by two soundings on the charts, to the eastward of the line of the expedition, in longitudes 125° and 120° W., and latitudes 9° and 11° N., one of over 3100 fathoms, the other of more than 2550 fathoms. It was proposed to name this large depression Moser basin. Large hauls of red clay and manganese nodules were obtained from the bottom of this basin. The bottom temperatures of the Moser basin varied between 34°·6 at 2628 and 2740 fathoms, to 35°·2 at 2440 fathoms, and 35° at 2475 fathoms; about 120 miles from the Marquesas. At station No. 23, off the Marquesas, in 1802 fathoms, the temperature was 35°·5. The temperatures of the bottom between the Marquesas and Paumotus were 34°·9 at 1932 fathoms, 35° at 2456 fathoms and 2451 fathoms, and 35°·1 at 2527 fathoms. An extensive collection of surface animals was obtained, including many interesting forms. On the way to Tahiti a few days were devoted to an examination of the westernmost atolls of the Paumotus. Prof. Agassiz inclines to the opinion that these atolls have been formed in an area of elevation similar to that of Fiji. He points out, also, that the Paumotus are situated on a plateau similar to that upon which the Marquesas and Society islands are placed—this plateau having a depth of from 1200 to 1500 fathoms rising from the general oceanic basin which surrounds them, and which has a depth of from 2300 to 2500 fathoms. Furthermore, evidence of this elevation is found at the two extremities of the Paumotu plateau, at Makatea and the Gambier islands.

Journeys in the Gazelle Peninsula, New Britain.—Two short accounts of journeys in the mountainous districts of the Gazelle peninsula appear in the *Deutsches Kolonialblatt* for December 1 last. The first, by the Governor of German New Guinea, describes a visit to the Mission station St. Pauli among the Baining mountains, in the western part of the peninsula. The tract between the mountains and the coast contains a large area of very fertile soil, possibly suitable for cacao cultivation. A species of *Ficus* was also seen, which seemed to yield a good

* See *Geographical Journal*, vol. xiv. p. 215.

supply of caoutchouc. The strip immediately below the mountains is intersected with perennial streams, which sometimes disappear in the porous limestone. The path to the Mission station leads by the valley of the Malamga, clothed with splendid forest. The school at St. Pauli already has an average of twelve scholars, although the station is of quite recent date, the population of the neighbourhood sparse, and the country difficult to travel. The Bainings are an energetic and friendly disposed race, and good agriculturists. Their settlements are, as a rule, placed on the highest and steepest summits, one of which, 1000 feet higher than the station, was visited by the governor. The fertility of the soil among the mountains seems to vary greatly. The most characteristic forms of vegetation are luxuriant bamboos, wild bread-fruit trees, and the "gallip," a tall tree with spreading crown, producing edible nuts. The governor afterwards visited the northern parts of the peninsula, crossing over from Talili bay to Blanche bay, and following the path round the shores of the latter. There is one difficult spot where the mountains fall sheer to the sea, but the view over the bay is particularly fine. The second expedition was made by the Governor of Herbertshöhe to the Varzin mountains, to the south of Blanche bay. The way to the Catholic Mission station of St. Josephsthal leads first through cultivation, bush, and grass-land, and afterwards through high forest. The station lies in a fine position, and commands an extensive view over the Gazelle peninsula, which reveals the fact—confirmed by the excursions of the missionary, Pater Apunto, in the surrounding country—that the greater part of the peninsula is quite uninhabited. Several of the villages round the station were reached by steep paths, one of them leading through the dark ravine of a stream. The separate homesteads are widely scattered among the bush, and the huts are small and poor, not allowing a man to stand upright in them. From the Varzin mountains a comparatively level ridge runs north-west in the direction of Kabaira, with which place it would probably afford a good means of communication.

POLAR REGIONS.

Glacial Phenomena of Spitsbergen.—In a paper read before the Geological Society in June last, and printed in the fourth part of the *Quarterly Journal* of the Society for 1899, Mr. E. J. Garwood sums up the results of his observations on the glacial phenomena of Spitsbergen, made during his second visit with Sir Martin Conway. Some of the points were briefly touched upon by Mr. Garwood after the paper read by Sir Martin Conway before our Society; but they are now dealt with in greater detail, and throw valuable light on the phenomena of ice-sheets generally. Using the term "ice-sheet" in the sense of a covering of ice radiating from a watershed consisting of snow and ice, and not confined by visible barriers of rock, Mr. Garwood says that two such sheets exist in the part of Spitsbergen explored—one on each side of the depressed area connecting Dickson bay and Wijde bay; the radiating point and chief gathering-ground of each area lying somewhat north-west of its centre, with supplementary radiating points to the north and east. The peaks and ridges which protrude above the ice (*e.g.* Mount Chydenius and the Three Crowns) are in this view to be regarded as groups of "Nunatakkr." These ice-sheets seem to be the remnant of an ice-cap which once buried the country more deeply, the condition of things observable being probably almost identical with that which prevailed in our own country towards the close of the glacial epoch. The alpine-glacier stage has not yet been reached, the phenomena of valley-bound ground-ice with freely moving surface layers being still maintained, but the original central radiating point has been replaced by several decentralized points. Among the more particular features described are the ice-tunnels ascribed by Mr. Garwood to the arching up of ice-bridges on the closing of

crevasses; the bringing up of englacial moraines to the surface by the obstruction caused by nunatakkr; and the englacial streams with their deposits, which sometimes take the form of "kames" at right angles to the direction of the valley. Mr. Garwood was unable to gain any data respecting the rate of movement of the ice-sheets, but thinks that in the case of glaciers near the coast the rate is not less than 15 or 20 feet in twenty-four hours. From observations made at the termination of the King's bay glacier, he considers that the discharge of icebergs is caused primarily by the action of the tides, occurring during each rise and fall of the water, or four times in twenty-four hours. The size of the larger bergs, even supposing that these represented a portion of the ice-front which had resisted one such rise or fall, would indicate a daily motion of 16 to 20 feet, without allowing for the smaller fragments constantly falling. The paper also touches upon the action of sea-ice, and rock-sculpturing above the snow-line.

The Wellman Polar Expedition.—A detailed account of the Wellman polar expedition of 1898–99, with a map and illustrations, appears in the December number of the *National Geographic Magazine*. An outline of the scope and character of the meteorological work of the expedition, by Mr. Evelyn B. Baldwin, is also published in the same number. The main facts of the expedition have already been given in the *Geographical Journal* (see *Journal*, vol. xiv., 1899, p. 326). On June 26, 1898, the party sailed from Tromsö, in the ice-protected steamer *Frithjof*, calling at Archangel. The most northerly point was reached on March 20, 1899, off the east coast of Rudolf Land, near the 82nd parallel of latitude, 565 miles from the Pole. Subsequently a party, led by the meteorologist Baldwin, explored the eastern limits of Franz Josef Land. A voyage was also made in the unexplored parts of Markham sound in the relief steamer *Capella*, and altogether some twenty new lands or islands were added to the map of that archipelago. Confirmatory evidence is given as to the non-existence of the Dove glacier of Payer. Wilczek Land is also said to differ in form and dimensions from the Austro-Hungarian explorers' maps. The results of the scientific work of the expedition to be published later include the observations of Mr. Baldwin on the *aurora borealis*; Mr. Harlan's report on the aurora, particularly from the point of view of its effect upon the magnetic needle, as also his general study of the physical conditions of Franz Josef Land; and a report by Dr. Edward Hofma, medical officer and naturalist of the expedition, concerning the fauna and flora of that region. The meteorological observations by Mr. Baldwin will also appear in a subsequent paper.

GENERAL.

The Teaching of Geography.—Miss Reynolds was awarded the Gilchrist Travelling Studentship in connection with the University of Wales in 1898, and selected as her subject of study the methods of teaching geography in Switzerland and the north of Italy. She has now published a very interesting report,* giving the result of her studies. The greater part of the report is occupied with Switzerland. The part which geography should play in education is first considered with reference to the views of Rousseau, Pestalozzi, and the Swiss geographical teachers of to-day. The methods of geographical teaching in the Swiss universities and schools are then described separately, and some account of the complicated cantonal educational legislation is given. Chapters on school journeys and excursions, map-making and apparatus complete the section. While the whole of the report is

* 'The Teaching of Geography in Switzerland and North Italy.' By Joan Berenice Reynolds, B.A. London: C. J. Clay & Sons. 1899.

useful and very helpful for the teachers of geography, special interest attaches to the chapters on school excursions, maps, and apparatus. The school excursion and the school journey are not exclusively geographical as practised in Switzerland, or in Germany, but they are entirely educational. Perhaps the most valuable of their lessons is the early training in travel. There is probably no luxury less fully enjoyed than ordinary tourist travel, simply because the tourist has no idea how to occupy his time or what to look at. The same effect is often to be traced in the more ambitious journeys of explorers. Miss Reynolds shows in great detail how school excursions are organized, and points out also in what particulars they often fall short of the ideal. It remains to be seen how such a method of training could be applied in this country in different social and educational conditions.

OBITUARY.

General Tillo.*

On January 11 (New Style), 1900, at half-past eight in the morning, after a short but painful illness, Lieut.-General A. A. Tillo, a Vice-President of the Imperial Russian Geographical Society, passed away.

The deceased, besides his purely military duties, was widely known and respected in the world of science for his great and successful researches. Having received an excellent training in geodesy at two military academies—that of the Artillery and Staff College—he lost no opportunity of acquiring knowledge, and while in Strassburg in 1879, in attendance on H.H. the Grand Duke George of Mecklenburg, for whom he acted as tutor, he seized the opportunity to attend a complete course of lectures on Jurisprudence at the University of that city. Having thoroughly mastered four languages (German, French, English and Italian), A. A. Tillo was able to develop his mental powers by study, and found time by his industrious habits to read through a mass of literature relating to various branches of science. He showed the wide range of his learning by his works, among which there were treatises on cartography, geodesy, hypsometry, terrestrial magnetism, meteorology, and lastly pure geography. Many of these are works of great importance, such as 'The Hypsometrical Map of Russia,' 'Essay on a Tabulation of Levellings of the Russian Empire,' 'The Aralo-Caspian Levelling,' 'Terrestrial Magnetism in the Orenburg Region,' 'Researches on Geographical Distribution and Secular Variations in the Dip and Deflection of the Magnetic Needle throughout European Russia,' 'The Distribution of Atmospheric Pressure in the Russian Empire and Asia on the Basis of Observations taken between 1836 and 1885,' 'Map of the River Basins of European Russia,' etc. The number of his separately published works reached one hundred, and there are others unpublished of great value. Of these the following are prepared for publication: 'Map of the River Basins of Asiatic Russia,' 'Area of the Russian Empire,' 'Lengths of the Rivers of Asiatic Russia,' etc.

Many of these works required the co-operation of a few assistants, and Tillo always knew how to inspire them with a love for their task and combine their labours with his own with the happiest result. His rare tact combined with his wide knowledge gave him great authority and influence, and it was due to these

* We are indebted to Lieut.-Colonel Jules Shokalsky, Secretary of the Physical Section of the Imperial Russian Geographical Society, for the following brief memoir of the late Lieut.-General A. A. Tillo.

that he achieved brilliant results in his yet unfinished work—'Expeditions to examine the Headwaters of the Principal Rivers of European Russia,' for which he had to make use of a number of fellow-workers in the various departments of science. Having collected a mass of materials bearing on various questions, Tillo never withheld or declined to impart information to others engaged on similar studies, a fact which the writer of this memoir can testify from his own personal experience. It was due to Tillo's initiative that the Geographical Society undertook a series of researches on magnetic anomalies in the government of Kursk, and collected rich materials for the hypsometry of Russia. With all his great erudition Tillo was conspicuous for his modesty, and knew how to listen to others and respect their opinions.

Geographical science and Russia have lost in him a foremost worker and a good man in the best sense of these words.

Dr. Paulitschke.

The well-known African traveller, Dr. Philipp Paulitschke, Imperial Councillor and Professor at Vienna University, died in that city on December 11, 1899. Born at Tschermagowitz, in Moravia, he made himself a name by his ethnographical researches in the Somal and Galla countries, in which he and his companion, Von Hardegger, were the first Europeans to penetrate south of Harrar as far as Bia Woraba. The most valuable monument of his active literary career is his 'Ethnographie Nordost-Afrikas,' in which work, aided by the linguistic researches of the deceased A. W. Schleicher, he treated in an exhaustive way both of the material and moral culture of the peoples of that part of the continent.

CORRESPONDENCE.

The Régime of the Okavango River.

I WAS interested to read in your last issue Major Gibbons's account of his travels in Barotseland, particularly that portion relating to the Magwegena spruit, which connects the Okavango river with the Kwando.

Major Gibbons speaks of this as merely forming an overflow of the Okavango "during two months of the year, becoming waterless during the dry season." But in this he is incorrect. It so happens that in August last—the height of the dry season—I was on the Magwegena myself. It was then flowing freely, and much of the country on both banks was flooded. And yet when Major Gibbons saw it in April or May it was dry.

It follows, therefore, that there is a double overflow each year from the Okavango into the Kwando; while curiously enough, as it is well known, the Kwando itself comes down twice annually in flood, at the same time as the Okavango is overflowing. Obviously, then, the same causes make both the Okavango and the Kwando rise, not only in the wet season, but also again in the dry.

Hitherto, I believe, the suggestion has held ground that the second rise in the Kwando may be caused by the accumulated rainfall at its source being held back by vegetable growths in the river-bed, so as not to reach the Linyanti marshes until some months after the local rainfalls have been carried off by the stream, and that thereby the second overflow at this point is caused. But now that we know that the Okavango also has this double rise, this theory is rendered less tenable, unless we are to understand that the upper reaches of both rivers are so exactly alike that

the rainfall at their sources occupies just the same time in percolating through the vegetable growths which are said to obstruct their respective beds. At the same time I confess that no other feasible explanation occurs to me. The subject is, however, a very interesting one, and it is possible that, now that renewed attention is called to the facts, some of the Fellows of the Society who are acquainted with the upper portions of either river may be able to give us the benefit of their knowledge, with a view to clearing up what at present is somewhat of a mystery.

PERCY C. REID.

Feering Bary, Kelvedon, January 18, 1900.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By HUGH ROBERT MILL, D.Sc., *Librarian*, R.G.S.

THE following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Abh. = Abhandlungen.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Com. = Commerce.
C. Rd. = Comptes Rendus.
Erdk. = Erdkunde.
G. = Geography, Geographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
Iz. = Izvestiya.
J. = Journal.
k. u. k. = kaiserlich und königlich.
M. = Mitteilungen.
Mag. = Magazine.
Mem. = Memoirs, Mémoires.
Met. = Meteorological.
P. = Proceedings.
R. = Royal.
Rev. = Review, Revue.
S. = Society, Société, Selskab.
Sitzb. = Sitzungsbericht.
T. = Transactions.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.
Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

A selection of the works in this list will be noticed elsewhere in the "Journal."

EUROPE.

Bulgaria.

Trade of Bulgaria for the year 1898. Foreign Office, Annual No. 2357, 1899. Size 10 × 6½, pp. 58. *Price* 3*d*.

Europe. **Chisholm.**

Stanford's Compendium of Geography and Travel (New Issue), Europe. Vol. i. The Countries of the Mainland (excluding the North-West). By George G. Chisholm, B.Sc. London: E. Stanford, 1899. Size 8 × 5½, pp. xx. and 736. *Maps and Illustrations. Price* 15*s*. *Presented by the Publisher.*

This is referred to in the *Journal*, p. 172.

Europe—Glacial Period. *Naturw. Wochenschrift* **14** (1899): 525–528, 537–543. **Weber.**

Versuch eines Ueberblicks über die Vegetation der Diluvialzeit in den mittleren Regionen Europas. Von Dr. C. A. Weber.

Europe—Historical. *Mem. A. Imp. Sci. St.-Pétersbourg* **3** (1899): 1–184. **Westberg.**

Ibrâhîm's-Ibn-Ja'kûb's. Reisebericht über die Slawenlande aus dem Jahre 965. Von Friedrich Westberg.

A critical study of the report of the journey of Ibrahim ibn Jakub through the country of the Slavs in A.D. 965, with notes as to the identification of the places mentioned by him.

Europe—Historical. *J. Manchester G.S.* **15** (1899): 24–37. **Howorth.**

The Changes in the Political Map of Europe during the Nineteenth Century, as illustrated by Copper Coins. By D. F. Howorth. *With Illustrations.*

Europe—Statistics. **Supan.**

Die Bevölkerung der Erde. Periodische Uebersicht über neue Arealberechnungen, Gebietsveränderungen, Zählungen und Schätzungen der Bevölkerung auf der gesamten Erdoberfläche. Herausgegeben von Alexander Supan. X. Europa.—Dr. A. Petermann's Mitteilungen. Ergänzungsheft Nr. 130. Gotha: Justus Perthes, 1899. Size 11 × 7½, pp. vi. and 83.

The area and population of all the countries of Europe at the census of 1891 and 1895, with occasional supplementary or later data. Maps are given of the change in the northern frontier of Greece and of the density of population in Russia.

France. *C. Rd.* **129** (1899): 1041–1043. **Martel.**

Sur de nouvelles recherches souterraines en Dévoluy (Hautes-Alpes) et sur le plus profond puits naturel connu (chourun Martin, 310^{m}). Note de M. E.-A. Martel.

France. *G.Z.* **5** (1899): 580–587, 618–630. **Auerbach.**

Ueber französische Länderkunde. Von Prof. B. Auerbach.

On the physical geography of France.

France. *Ann. G.* **8** (1899): 427–437. **Bigourdan.**

La Carte de France, d'après l'ouvrage du colonel Berthaut. Par M. G. Bigourdan. *With Maps.*

Historical studies of the survey of France from 1750 to 1898, with reproduced specimens of the various maps referred to.

France—Loire. **Joanne.**

Collection des Guides-Joanne. Itinéraire général de la France. Par Paul Joanne. La Loire. Paris: Hachette et C^{ie}, 1899. Size 6½ × 4½, pp. 48, xx., and 338. *Maps and Plans.*

France—Marseilles. *B.S.G. Marseille* **23** (1899): 7–30. **Masson.**

Marseille port colonial. Par M. Paul Masson. *With Diagrams.*

France—Mont Blanc. *C. Rd.* **129** (1899): 993–996. **Janssen.**

Note sur les travaux au mont Blanc en 1899. Par M. J. Janssen.

France—Morvan. *Ann. G.* **8** (1899): 405–426. **Martonne.**

Une excursion de géographie physique dans le Morvan et l'Auxois. Par M. E. de Martonne. *With Maps and Plates.*

France—Normandy. *C. Rd.* **129** (1899): 1043–1045. **Thoulet.**

Évaluation approchée de la dénudation du terrain crétacé des côtes normandes. Note de M. J. Thoulet.

Germany—Bavaria. *Sitzb. A.W. München* (1899): 197–222. **Weinschenk.**

Geologisches aus dem bayerischen Walde. Von Dr. E. Weinschenk. *With Maps and Illustrations.*

Germany—Elbe. *Deutsche Rundschau G.* **22** (1899): 24–32. **Henz.**

Das Delta der Elbe. Von W. Henz. *With Illustration.*

Germany—Prussia. **Schöne.**

Der Fläming. Von Dr. Emil Schöne. Wissenschaftliche Veröffentlichungen des Vereins für Erdkunde zu Leipzig. Vierter Band. Beiträge zur Geographie des mittleren Deutschland. Herausgegeben . . . von Friedrich Ratzel. Leipzig: Duncker & Humblot, 1899. Pp. 91–194. *Map and Illustrations.*

On the origin of the name Fläming as applied to the low bare ridge in the south of the North German plain on the borders of Anhalt.

Germany—Saxony. **Wohlrab.**

Das Vogtland, als orographisches Individuum. Eine Studie zur deutschen Landeskunde. Von Dr. Albert Wohlrab.—Forschungen zur deutschen Landes- und Volkskunde . . . herausgegeben von Dr. A. Kirchhoff. Zwölfter Band. Heft 2. Stuttgart: J. Engelhorn, 1899. Size 9½ × 6½, pp. 97–185. *Map and Illustrations.*

Germany—Thüringerwald. **Kändler.**

Kritik orometrischer Werte und Richtungsverhältnisse der Kamm- und Thalbildungen im Thüringerwald. Von Max Kändler.—Wissenschaftliche Veröffent-

lichungen des Vereins für Erdkunde zu Leipzig. Vierter Band. Beiträge zur Geographie des mittleren Deutschland. Herausgegeben . . . von Friedrich Ratzel. Leipzig: Duncker & Humblot, 1899. Pp. 281–382.

On the crests and valleys of the Thüringerwald, considered in relation to the orographical structure of the group.

Greek Temples. *P.R.S.* **65** (1899): 370–375. **Penrose.**

On the Orientation of Greek Temples, being the results of some observations taken in Greece and Sicily in the month of May, 1898. By F. C. Penrose.

Hungary. *Deutsche Rundschau G.* **21** (1899): 503–507. **Szirbusz.**

Die Trockenlegung des Ecsedermoores. Von Dr. Géza Szirbusz. *With Map.*

On the draining and reclamation of a great marsh near Nagy-Károly in Hungary.

Italy. **Deecke.**

Italien. Von Prof. Dr. W. Deecke.—Bibliothek der Länderkunde, herausgegeben von Dr. Alfred Kirchhoff und Dr. Rudolf Fitzner. Dritter und vierter Band. Berlin: A. Schall [1898]. Size 10½ × 7, pp. xii. and 514. *Maps, Plans, and Illustrations. Price* 14 *m.*

A complete geographical description of Italy, based on geological structure, and including all the conditions of which modern geographical description takes account. The Maltese island group is included, although Corsica, which has certainly an equal claim to be included in Italy, is left out of account.

Italy—Malaria. *Atti R. A. Lincei, Rendiconti* **8**, 2 Sem. (1899): 193–203. **Grassi.**

Osservazioni sul rapporto della seconda spedizione malarica in Italia, presieduta dal Prof Koch, composta oltre che dallo stesso Koch, dal Prof. Frosch, dal dottor Ollwig e coadiuvata dal Prof. Gosio. Nota del Socio B. Grassi.

Italy—Roads. *B.S.G. Italiana* **12** (1899): 481–489. **Rosetti.**

Tre vie romane della Romagna: Emilia, Flaminia e Popilia, nota del E. Rosetti.

Portugal. *J. Manchester G.S.* **15** (1899): 75–122. **Newby.**

Portugal, the Portuguese, and the Vasco da Gama Celebration, 1898. By John R. Newby. *With Sketch-map and Illustrations.*

Russia. *P. Philosoph. S. Glasgow* **30** (1899): 192–222. **Mavor.**

From the Baltic to the Caspian. A Voyage across Russia. By Sam. Mavor. *With Map and Illustrations.*

Russia—Canals. *Ann. G.* **8** (1899): 469–471. **Legras.**

Le système Marie. Par M. J. Legras. *With Map.*

The Marie system of inland waterways leads from the Volga, starting at Rybinsk, up the Cheksna, and thence by canal past the White Lake, and skirting the southern shore of Lakes Onega and Ladoga to the Neva. A shorter system of canals runs from Rybinsk up the Mologa river, and down the Tykva to join the Neva canal on Lake Ladoga.

Russia—Finland. *Fennia* **17** (1899). ———

Atlas de Finlande. Texte. Publié par la Société de Géographie de Finlande. *With Diagrams and Illustrations.*

The explanatory text accompanying the special Atlas of Finland published by the Finnish Geographical Society. See review, p. 145.

Russia—Northern. **Pearson.**

'Beyond Petsora Eastward.' Two Summer Voyages to Novaya Zemlya and the Islands of Barents Sea. By Henry J. Pearson. With Appendices on the Botany and Geology, by Colonel H. W. Feilden. London: R. H. Porter, 1899. Size 9½ × 7⅓, pp. xiv. and 336. *Maps and Illustrations. Price* 22*s.* 6*d. net. Presented by the Author.*

Mr. Pearson has collected the narrative of two voyages to the borders of the arctic regions in 1895 and 1897, and the various monographs which have since been presented to different learned societies on the natural history collections. The whole forms a handsome volume illustrated by a large number of excellent photographs of the scenery, people, fauna, and flora of the extreme north of European Russia. The Russian names have not been transliterated in accordance with a definite system, and several forms of the same word occur. An unusual feature (which it would be well for other authors to follow) is the inclusion of numerous sketch-plans of parts of the districts traversed, so that the reader has the greatest facility in following the descriptions. A general chart is also given.

Switzerland. *Jahrb. Schweizer Alpenclub* **34** (1899): 225–252. **Bähler.**

Das Pommat und die deutsche Sprachgemeinde Bosco im Tessin. Von Dr. A. Bähler. *With Illustrations.*

On the distribution of languages in Ticino.

Switzerland. *Jahrb. Schweizer Alpenclub* **34** (1899): 265–274. **Mercanton.**

Les débâcles au glacier de Crête-Sèche. Par Paul L. Mercanton. *With Illustrations.*

Switzerland. *Jahrb. Schweizer Alpenclub* **34** (1899): 253–264. **Stoffel.**

Wege und Stege der Landschaft Avers. Von S. Stoffel. *With Illustrations.*

United Kingdom—England. *J.S. Arts* **48** (1899): 6–20. **Barry.**

Opening Address. By Sir John Wolfe Barry, K.C.B., etc. *With Plans and Sections.*

On providing means of crossing two currents of traffic at right angles by means of subways, applicable to the busiest centres of London.

United Kingdom—England. *Geolog. Mag.* **6** (1899): 501–505. **Dawkins.**

On the South-Eastern Coalfield. By Prof. W. Boyd Dawkins.

The boring at Ropersole, in the Weald of Kent, establishes the fact that the Dover coalfield extends northwards for a distance of eight miles and beyond in the direction of Canterbury. The coalfield does not extend as far to the south-west as Brabourne, where strata believed to be of Devonian age have been found by boring. The upper surface of the coal-measures is found at Dover at a depth of 1100 feet, and at Ropersole at 1181 feet.

United Kingdom—England—Devon. **Peek.**

Rousdon Observatory, Devon. Vol. xv. Meteorological Observations for the Year 1898, made under the superintendence of Sir Cuthbert E. Peek, Bart. London, 1899. Size 11 × 9, pp. 40. *Plate. Presented by Sir Cuthbert Peek.*

United Kingdom—England and Wales. *P.R.I.* **15** (1899): 679–697. **Mansergh.**

The Bringing of Water to Birmingham from the Welsh Mountains. By James Mansergh. *With Illustrations.*

Particulars of the Elan drainage area near the sources of the Wye and Severn, which is to be utilized for the supply of water to Birmingham. A sketch-map is given of the water-supplies of Manchester, Liverpool, Stockton, and Birmingham, and special maps of the Elan area, with pictures of the works under construction.

United Kingdom—Radcliffe Observations. **Stone and Rambaut.**

Astronomical and Meteorological Observations made at the Radcliffe Observatory, Oxford, in the Years 1890–1891, under the Superintendence of the late Edward James Stone, M.A., etc. Edited by Arthur A. Rambaut, M.A., etc. Vol. xlvii. Oxford: J. Parker & Co., 1899. Size 10½ × 6¾, pp. xxvi., 240, xii., and 68. *Presented by the Radcliffe Trustees.*

United Kingdom—Scotland. *Geolog. Mag.* **6** (1899): 472–479, 510–520. **Lapworth.**

The Survey Memoir on the Scottish Uplands. By Prof. C. Lapworth.

United Kingdom—Scotland—Skye. *Geolog. Mag.* **6** (1899): 485–491. **Harker.**

Notes on Subaërial Erosion in the Isle of Skye. By Alfred Harker.

A study of the erosion of the tertiary volcanic rocks in the island of Skye.

ASIA.

Asia—Railways. *Fortnightly Rev.* **66** (1899): 914–925. **Long.**

Russian Railway Policy in Asia. By R. E. C. Long. *With Map.*

A sketch of various Russian plans for an Asiatic railway system, including the projected line from Saratov, passing between the Caspian and Aral seas to Charjui, and thus uniting the Transcaspian and European railway systems.

Ceylon. *J.R. Colonial I.* **31** (1899): 9–44. **Ferguson.**

Ceylon in 1899. By John Ferguson.

Ceylon—Colombo. *J.S. Arts* **48** (1899): 73–95. **Ferguson.**

Old and New Colombo. By John Ferguson.

China. *Rev. Française* **24** (1899): 651–658. **Schotter.**

Le Kouytchéou. Par Aloys Schotter.

China—Chekiang. *B.S.G. Italiana* **12** (1899): 408–418. **Vannutelli.**

Una escursione nel Ce-Kiang, lettera del socio ten. di vascello L. Vannutelli. *With Map and Illustrations.*

A trip from Ningpo in the early part of 1899.

China—Kiungchow. **Butler.**

Trade of Kiungchow for the Year 1898. Foreign Office, Annual No. 2348, 1899. Size 10 × 6, pp. 14. *Price* 1*d.*

China—Yangtse Valley. **Bishop.**

The Yangtze Valley and Beyond. An account of Journeys in China, chiefly in the Province of Sze Chuan and among the Man-tze of the Somo Territory. By Mrs. J. F. Bishop. London: John Murray, 1899. Size 9½ × 6½, pp. xvi. and 558. *Map and Illustrations. Price* 21*s. Two copies, one presented by the Author, the other by the Publisher.*

A full record of Mrs. Bishop's journey up the Yangtse in 1896, of which a summary description was given in the *Journal* for July, 1897, vol. x. p. 19. See notice, p. 149.

China—Yangtse. **Scidmore.**

Cruising up the Yangtsze. By Eliza Ruhamah Scidmore. From the *Century Magazine*, September, 1899, pp. 668–679. *Illustrations.*

Chinese Empire—Mongolia. *B.S.G. Paris* **20** (1899): 308–329. **Klementz.**

Voyages de Dmitri Klementz en Mongolie occidentale, de 1885 à 1897. *With Map.*

Hong Kong. **Blake.**

Hong Kong. Report for 1898. Colonial Reports, Annual No. 282, 1899. Size 9½ × 6, pp. 34. *Price* 2½*d.*

India. **Durand.**

The Making of a Frontier. Five Years' Experiences and Adventures in Gilgit, Hunza, Nagar, Chitral, and the Eastern Hindu-Kush. By Colonel Algernon Durand, C.B. London: John Murray, 1899. Size 9 × 6, pp. xvi. and 298. *Map, Portrait, and Illustrations. Price* 16*s. Presented by the Publisher.*

A history of the formation of the Gilgit frontier, of value, as the author claims, not for the revelation of facts from official sources, but for the absence of such inaccuracies as an outsider might fall into in discussing facts already accessible to the public.

India. *J. Manchester G.S.* **15** (1899): 159–173. **Hatch.**

Our Indian Empire: with Personal Reminiscences of a Tour from Charing Cross to the North-West Frontier. By E. F. G. Hatch, M.P. *With Map and Illustrations.*

India—Archæology. *Nouv. Archives Miss. Sci.* **9** (1899): 521–558. **Foucher.**

Rapport sur une mission d'études archéologiques et religieuses dans l'Inde. Par M. A. Foucher.

The mission lasted from November, 1895, to October, 1897. The journey included a short stay in Ceylon, a visit to Southern India and Madras, then to Calcutta, Benares, Lucknow, Lahore, and a longer sojourn in Kashmir. After this the Swat valley was visited, and the journey concluded at Bombay.

India—Madras. ———

Report on the Madras Observatory for 1898–99. Size 13 × 8½, pp. 8. *Diagram.*

India—Madras. *P.I. Civil Engineers* **137** (1899): 2–71. **Jones.**

The Waterworks of the Madras Presidency. By J. A. Jones. *With Map and Plans.*

India—North-West Frontier. ———

A Dictionary of the Pathan Tribes on the North-West Frontier of India, compiled under the orders of the Quarter-Master-General in India, in the Intelligence Branch. Calcutta, 1899. Size 6½ × 4½, pp. 240. *Map. Presented by the Indian Government.*

This little book gives in compact form the names and tribal relations of about 2500 tribes, clans, divisions, subdivisions, sections, and minor fractions of the Pathan people, each class mentioned being a portion of that mentioned before, and comprising several of that which follows: *e.g.* "the Dadu Khel are a minor fraction of the Dreplara section of the Khusrogi subdivision of the Nasruddin division of the Zakha Khel clan of the Afridi tribe."

India—North-West Frontier. **Foucher.**

Tour du Monde 5 (1899): 469, 481, 493, 541, 553.

Sur La Frontière Indo-Afghane. Par M. A. Foucher. *With Map and Illustrations.*

The author went up to the British outposts in order to study the ancient monuments in the Afridi country.

India—Rajputana States. **Adams.**

The Western Rajputana States. A medico-topographical and general account of Marwar, Sirohi, Jaisalmir. By Lieut.-Colonel Archibald Adams. London: Junior Army and Navy Stores, 1899. Size 9½ × 6½, pp. xii. and 456. *Illustrations. Presented by the Author.*

The various states of Western Rajputana are described with regard to their geographical position, geology, climate, flora, fauna, and political organization. Portraits are given of a number of the ruling princes and of many of the interesting buildings. Perhaps the most valuable part of the work, as forming the subject of the author's professional studies, is the discussion of the sanitary, hygienic, and medical conditions of the several states. This forms the essential part of the description, the other data being intended to give it completeness and a more general interest to the public. The book is written by official direction, and published by the Marwar Darbar, *i.e.* the government of Jodhpore, the chief of the states described.

India—Standard Time. *P. Asiatic S. Bengal* (1899): 62–66. ———

Letter to H.E. the Viceroy on the introduction of a standard time for India.

A summary of the arguments for the introduction in India of standard time based on the meridian of Greenwich.

India—Tide Tables. **Crosthwait and Roberts.**

Tide-Tables for the Indian Ports for the Year 1900 (also January, 1901). Part i.—Western Ports. (Suez to Pámban Pass.) Part ii.—Eastern and Burma Ports. (Galle to Port Blair.) By Lieut. H. L. Crosthwait and E. Roberts. Size 6½ × 4½, pp. 1204.

India—Time. *P. Asiatic S. Bengal* (1899): 49–55. **Oldham.**

On Time in India: a suggestion for its improvement. By R. D. Oldham.

Arguments for introducing standard time in India, based on Greenwich meridian.

Indo-China. *B.S. Bretonne G.* 18 (1899): 102–115. ———

Sur l'origine des races de l'Indo-Chine française. *With Map.*

Malay Archipelago—Celebes. **Koperberg.**

Tijds. K. Ned. Aard. Genoots. Amsterdam 16 (1899): 589–592.

Het Meer "Danau" in Bolaäng Mongondo. Door M. Koperberg.

Malay Archipelago—Celebes. **Kruijt.**

Tijds. K. Ned. Aard. Genoots. Amsterdam 16 (1899): 593–618.

Het stroomgebied van de Tomasa-rivier. Door Alb. C. Kruijt. *With Map.*

Malay Archipelago—Siauw. **Dinter.**

Tijds. Ind. Taal-, Land- en Volkenk. 41 (1899): 324–390.

Eenige geographische en ethnographische aanteekeningen betreffende het eiland Sidoe. Door B. C. A. J. van Dinter. *With Map.*

Malay Archipelago—Sumatra. **Kroesen.**

Tijds. Ind. Taal-, Land- en Volkenk. 41 (1899): 253–285.

Nota omtrent de Bataklanden (specinal Simeloengoen). Door J. A. Kroesen.

On the Battak country in Sumatra.

Malay Archipelago—Sumatra. **Kroesen.**

Tijds. Ind. Taal-, Land- en Volkenk. 41 (1899): 211–252.

Rapport betreffende de aanvaarding van de onderwerping aan het Nederlandsch oppergezag van het landschap Tanah Djawa. Door J. A. Kroesen.

Malay States. ———

Straits Settlements. Reports on the Federated Malay States for 1898. London: Eyre & Spottiswoode, 1899. Size 13½ × 8½, p. 78. *Price* 8½*d.*

Russia—Central Asia—Railway. *B.S.G. Marseille* 22 (1898): 295–314. **Gourdet.**

Le Chemin de fer dans l'Asie centrale. Par M. Paul Gourdet.

The author, who holds a public appointment in the town of Vyerni, gives an account of the Trans-Caspian railway and its extension to Tashkent, referring also to the part the railway is destined to take in the development of the country.

Russia—Caucasus. *B.S.G. Com. Havre* **16** (1899): 263–285, 323–339, 419–439. **Baye.**

Au sud de la chaîne du Caucase (souvenirs de voyage). Par Le Baron De Baye. *With Illustrations.*

The illustrations are excellent.

Russia—Transcaucasia. **Rossmässler.**

Deutsche Rundschau G. **21** (1899): 507–511, 541–551.

Reiseerinnerungen aus den Karabagh'schen Bergen. Von F. Rossmässler.

Russia—Siberia. *Scottish G. Mag.* **15** (1899): 583–595. ——

The Tian-Shan: its Vertical Relief, Hydrography, etc.

An abstract of Dr. Max Friederichsen's work, "Morphologie des Tien-Schan."

Turkey—Asia Minor. *Deutsche G. Blätter* **22** (1899): 153–169. **Grothe.**

Deutsche Kulturmission in Kleinasien. Von Dr. L. H. Grothe.

On the great future which German initiative is to bring to Asia-Minor.

Turkey—Syria. *Nouv. Archives Miss. Sci.* **9** (1899): 265–511. **Parisot.**

Rapport sur une mission scientifique en Turquie d'Asie. Par J. Parisot.

This journey was made with the object of studying the Syrian language and Asiatic music, and to make a collection of Maronite, Syrian, and Chaldean songs. The studies were made in the neighbourhood of Damascus, in the Lebanon, at Beirut, etc. The music of a large number of Maronite, Arab, Syrian, Chaldean, and Jewish chants and songs is reproduced.

Turkey—Syria. **Thomas.**

Two Years in Palestine and Syria. By Margaret Thomas. With Sixteen Illustrations reproduced in Colours in facsimile of the Original Paintings by the Author. London: J. C. Nimmo. 1900 [1899]. Size 9 × 6, pp. xiv. and 344. *Price* 12*s.* 6*d.* *Presented by the Publisher.*

The main feature of this account of a sojourn in Palestine (1895–97) is the novelty of reproducing the author's very effective paintings by means of the "three-colour" process. The result is striking and vivid.

AFRICA.

Africa—Missionary Researches. **Maples.**

Journals and Papers of Chauncy Maples, D.D., F.R.G.S., late Bishop of Likoma, Lake Nyasa, Africa. Edited by Ellen Maples. London: Longmans & Co., 1899. Size 8 × 5¼, pp. 278. *Portrait and Map. Price* 6*s.* 6*d.* *Presented by the Publishers.*

This book consists of a series of extracts from the writings of the late Bishop Maples, of a varied nature. There are descriptions of journeys with notes on the wild life of the country, records of mission work, sermons, essays, and articles contributed to different publications. The descriptive parts are admirably graphic.

Algeria. *B.S.G. Paris* **20** (1899): 285–303. **Huguet.**

Dans le Sud algérien. Par le Dr. J. Huguet. *With Maps and Plans.*

Algeria—Constantine. **Monségur.**

Rev. G. **44** (1899): 415; **45** (1899): 46, 124, 252, 321, 426.

Étude sur la province de Constantine. Par le Commandant A. Monségur. *With Maps and Plan.*

Algeria—Railways. *Questions Dipl. et Colon.* **8** (1899): 129–156. **Bernard.**

Les Chemins de fer en Algérie. Par Augustin Bernard. *With Maps.*

On the existing and projected railways of Algeria.

Algeria—Sahara. *Globus* **76** (1899): 202–208. **Huguet and Pettier.**

El Golea, der südlichste Stützpunkt der Franzosen in der algerischen Sahara. Nach Huguet und Pettier. *With Illustrations.*

Congo. *B.S.R.G. d'Anvers* **23** (1899): 224–238. **Buls**

Du Stanley-Pool au Stanley-Falls. Conférence. Par M. Ch. Buls.

Notes of a lecture describing a voyage along the Congo on the occasion of the opening of the Congo railway.

Congo State. *Rev. Scientifique* **12** (1899): 742–750, 784–788. **Lancaster.**

Le climat du Congo. Par M. A. Lancaster. *With Map and Diagrams.*

Congo State. **Thonner.**

Dans la grande forêt de l'Afrique Centrale. Mon Voyage au Congo et à la Mongala en 1896. Par Franz Thonner. Bruxelles: Oscar Schepens & Cie., 1899. Size 10½ × 7, pp. x. and 116. *Maps and Plates. Presented by the Publishers.*

This is a translation from the German original dealing with a journey through the great equatorial forests of the Congo and Mongala. The main feature of the book is the series of eighty-seven full-page collotype reproductions of photographs of scenery, dwellings, and people.

German West Africa—Kamerun. *Deutsches Kolonialblatt* **10** (1899): 510–513. **Plehn.**

Ueber die Gründung der Station am Mgoko und Bereisung der Flüsse Ngoko, Bumba und Dscha.

Ivory Coast. *Nouv. Archives Miss. Sci.* **9** (1899): 157–264. **Eysséric.**

Rapport sur une mission Scientifique à la Côte d'Ivoire. Par M. J. Eysséric. *With Maps and Illustrations.*

A journey up the Bandama river and in the Baule country in 1896–97. Particulars are given of the surveys and the fixing of astronomical points. A series of small maps in colours shows the geology, forests, languages, and density of population.

Nigeria.

Correspondence relating to the Benin Territories Expedition, 1899. London: Eyre & Spottiswoode, 1899. Size 13¼ × 8½, pp. 22. *Price* 2½*d.*

Somaliland. *A travers le Monde, Tour du Monde* **5** (1899): 369–371. **Goedorp.**

Chez les Somalis. Par Victor Goedorp. *With Illustrations.*

On a journey inland from Obok.

South Africa. **Bryce.**

Impressions of South Africa. By James Bryce. With Three Maps. Third Edition, revised throughout, with a new prefatory chapter, and with the Transvaal Conventions of 1881 and 1884. London: Macmillan & Co., 1899. Size 8 × 5½, pp. lxiv. and 500. *Price* 6*s. Presented by the Publishers.*

Mr. Bryce has added an introductory chapter, giving a brief review of the events in South Africa during the last two years, but without entering into a minute history of the political difficulties which led to the war, concerning which there are still serious differences of opinion. The work has been brought up to date throughout.

South-West Africa. **Möller.**

Resa i Afrika genom Angola, Ovampo och Damaraland. Af P. Möller. Stockholm: W. Billes, 1899. Size 9½ × 6½, pp. 226. *Map and Illustrations. Presented by the Publisher.*

Captain Möller landed at Mossamedes, and, after some journeys in the interior of Angola, turned southward in 16° E. and traversed the centre of Ovampoland and Damaraland, finally leaving the country at Walfisch bay.

Transvaal. *Rev. Française* **24** (1899): 625–650. **Demanche.**

La Question du Transvaal. La rupture avec l'Angleterre. La guerre de l'indépendance (1880–1881). L'incursion de Jameson (1895–1896). Forces anglaises et boers. Par G. Demanche. *With Map.*

Transvaal. **Fitzpatrick.**

The Transvaal from Within. A Private Record of Public Affairs. By J. P. Fitzpatrick. London: W. Heinemann, 1899. Size 9 × 6, pp. xiv. and 452. *Price* 10*s.*

This is a history of the events in the Transvaal during the Reform agitation at Johannesburg, the Jameson raid, and subsequently down to the present year, written by one of the active participators.

Tunis. *Nouv. Archives Miss. Sci.* **9** (1899): 103–156. **Blanchet.**

Mission archéologique dans le centre et le Sud de la Tunisie (avril—août 1895). Par M. Paul Blanchet. *With Plans.*

Describes many ruins, and records inscriptions of the Roman period.

Uganda. *Blackwood's Mag.* **166** (1899): 631–643. **Malcolm.**

On Service in the Uganda Protectorate. By Captain Neill Malcolm.

Refers to the incidents of the march to the relief of the Sudanese garrison at Fowera in March, 1898, and describes the incidents of daily life amongst the Indian troops and Swahili porters in Uganda.

NORTH AMERICA.

Alaska. **Filippi.**

Dottore Filippo de Filippi. La Spedizione di sua altezza reale il Principe Luigi Amedeo di Savoia, Duca degli Abruzzi, al Monte Sant' Elia (Alaska), 1897. Illustrata da Vittorio Sella. Milano: Ulrico Hoepli, 1900. Size 11½ × 8, pp. xviii. and 284. *Maps and Illustrations. Presented by the Publisher.*

The official account of the Duke of the Abruzzi's expedition to Mount St. Elias, illustrated by the fine photographs of Signor Vittorio Sella. The book describes the journey by Seattle to Yakutat, the encampments and climbs on Mount St. Elias, with particulars of the various glaciers and peaks, and the return journey. Appendices deal with equipment, meteorology, hygiene, natural history collections, and bibliography. There is a general map of North-Western North America, and also a special map of the mountain.

Alaska. *B. American G.S.* **31** (1899): 344–355. **Gannett.**

The Harriman Alaska Expedition. By Henry Gannett. *With Map.*

A summary of this paper appears in the *Journal* for January, 1900.

Canada—New Brunswick. **Bailey.**

The Mineral Resources of the Province of New Brunswick. By L. W. Bailey. (Geological Survey of Canada, Part M, Annual Report, vol. x.) Ottawa, 1899. Size 10 × 6½, pp. 128. *Map and Illustrations. Presented by the Geographical Survey of Canada.*

A careful study of all the existing evidence as to the value of the minerals in New Brunswick, with a map showing the distribution of economic minerals in the province.

Canada—Ontario. **McInnes.**

Report on the Geology of the Area covered by the Seine River and Lake Shebandowan Map-Sheets, comprising portions of Rainy River and Thunder Bay Districts, Ontario. By William McInnes, B.A. (Geological Survey of Canada, Part H, Annual Report, vol. x.) Ottawa, 1899. Size 10 × 6½, pp. 66. *Maps (separate) and Illustrations. Presented by the Geographical Survey of Canada.*

Canada and Alaska—Boundary. ———

Treaty Series, No. 19, 1899. Exchange of Notes between the United Kingdom and the United States of America, providing for the establishment of a Provisional Boundary between the Dominion of Canada and the territory of Alaska in the region about the head of Lynn Canal. October 20, 1899. London: Eyre & Spottiswoode, 1899. Size 9½ × 6, pp. 4. *Price* ½*d.*

The text of the *modus vivendi* as to the Alaskan frontier.

United States—Colorado. **Spurr.**

Monographs of the United States Geological Survey. Vol. xxxi. Geology of the Aspen Mining District, Colorado, with Atlas. By Josiah Edward Spurr. Washington, 1898. Size 12 × 9½; Atlas, 21½ × 19; pp., xxxvi. and 260. *Illustrations. Presented by the U.S. Geological Survey.*

United States—East Coast. **Hills.**

Sailing directions for the East Coast of the United States. Compiled by Captain E. H. Hills. London: J. D. Potter, 1899. Size 9½ × 6½, pp. xx. and 888. *Index Chart. Price* 3*s.* 6*d. Presented by the Hydrographer, Admiralty.*

United States—Lake Superior Region. *P.I. Civil Engineers* **137** (1899): 72–130. **Head.**

The Lake Superior Iron-Ore Mines, and their Influence upon the Production of Iron and Steel. By J. Head and A. P. Head. *With Map and Plans.*

United States—Massachusetts. **Emerson.**

Monographs of the United States Geological Survey. Vol. xxix. Geology of Old Hampshire County, Massachusetts, comprising Franklin, Hampshire, and Hampden Counties. By Benjamin Kendall Emerson. Washington, 1898. Size 12 × 9½, pp. xx. and 790. *Maps and Illustrations. Presented by the U. S. Geological Survey.*

This includes the description of the greater part of the drainage area of the Connecticut river, which is situated in Massachusetts.

CENTRAL AND SOUTH AMERICA.

American Republics. ———

Monthly Bulletin of the Bureau of American Republics. October, 1899. Washington, 1899. Size 9½ × 6, pp. 437–584.

Andes. *Rev. Museo La Plata* **9** (1899): 197–220. **Burckhardt.**

Rapport préliminaire sur une Expédition géologique dans la région andine, située entre Las Lajas (Argentine) et Curacautin (Chili). Por Carl Burckhardt. *With Maps and Illustrations.*

The expedition here described took place in the early part of 1898, the part surveyed being the part of the Cordillera situated near 39° S., between the source of the Biobio and Valdivia. See notice, p. 181.

Andes. *Alpine J.* **19** (1899): 565–578. **Vines.**

The Ascent of Aconcagua and Tupungato. By Stuart Vines.

Andes. *Rev. Museo La Plata* **9** (1899): 221–242. **Wehrli.**

Rapport préliminaire sur mon Expédition géologique dans la Cordillère argentino-chilienne, du 40° et 41° latitude sud (région du Nahuel-Huapi). Par Dr. Leo Wehrli. *With Maps and Profile.*

Andes. *Rev. Museo La Plata* **9** (1899): 243–252. **Wehrli.**

Avis géologique sur la question du Divortium aquarum interoceanicum dans la region du lac Lacar. Par Dr. Leo Wehrli. *With Map and Illustrations.*

Argentine Republic. *An. S. Ci. Argentina* **48** (1899): 333–335. ——

La determinación de la posición geográfica de San Rafael (provincia de Mendoza).

Argentine Republic. *Rev. Museo La Plata* **9** (1899): 1–78. **Delachaux.**

Limites occidentales de la República Argentina.—El articulo del Dr. Juan Steffen: "La cuestion de limite chileno-argentina," con especial consideración de la Patagonia.—Exámen critico por Enrique S. Delachaux.

A critical study from the Argentine point of view of Dr. Steffen's article on the boundary between Chile and Argentina, in Patagonia, published in the *Zeitschrift* of the Berlin Geographical Society for 1897.

Chile. **Smith.**

Temperate Chile. A Progressive Spain. By W. Anderson Smith. London: A. & C. Black, 1899. Size 9 × 6, pp. x. and 400. *Map and Frontispiece. Price* 10*s.* 6*d. Presented by the Publishers.*

The record of a recent visit to Southern Chile for the purpose of inspecting and reporting on the country and its adaptability for immigration. See notice, p. 180.

Guatemala. **Maudslay.**

A Glimpse at Guatemala, and Some Notes on the Ancient Monuments of Central America. By Anne Cary Maudslay and Alfred Percival Maudslay. With Maps, Plans, Photographs, and other Illustrations. London: John Murray, 1899. Size 12 × 9½, pp. xviii. and 290. *Price* £4 4*s. Presented by the Authors.*

A gracefully written and superbly illustrated book of travel, full of observations on all aspects of nature as well as on the ancient buildings, the study of which formed the main object of the journey.

Guatemala. **Maudslay.**

Biologia Centrali-Americana; or, Contributions to the Knowledge of the Fauna and Flora of Mexico and Central America. Edited by F. Ducane Godman. Archæology. By A. P. Maudslay. [Part xi. September, 1899.] (Vol. ii. pp. 1–16.) London: R. H. Porter, and Dulau & Co. Size 13 × 10½. *Plates* i.–xxiv., *separate.*

Nicaragua. **Bell.**

Tangweera. Life and Adventures among Gentle Savages. By C. Napier Bell. London: E. Arnold, 1899. Size 9 × 6, pp. xii. and 318. *Illustrations. Price* 16*s. Presented by the Publisher.*

The record of life in the forests of the Mosquito coast about forty years ago, now written out from notes taken at the time. The chapters abound with sympathetic descriptions of wild nature, and of the unspoiled Mosquito Indians.

Porto Rico. **Dinwiddie.**

Puerto Rico: its Conditions and Possibilities. By William Dinwiddie. London and New York: Harper & Bros., 1899. Size 8½ × 5½, pp. 294. *Illustrations. Price* 10*s.* 6*d.*

A description of Porto Rico, based on a special visit of inquiry extending over two months immediately after the Spanish evacuation. It deals mainly with the resources and trade of the island.

AUSTRALASIA AND PACIFIC ISLANDS.

Australia—Handbook. ———

The Australian Handbook (incorporating New Zealand, Fiji, and New Guinea). Shippers, Importers and Professional Directory & Business Guide for 1899. London, etc.: Gordon & Gotch. Size 10 × 6½, pp. 640. *Maps, Plans, and Illustrations.*

Ellice Islands. ———

Australian Museum, Sydney. Memoir III. The Atoll of Funafuti, Ellice Group; its Zoology, Botany, Ethnology, and General Structure, based on collections made by Mr. Charles Hedley of the Australian Museum, Sydney, N.S.W. Parts 8 and 9. Sydney, 1899. Size 10 × 6. *Illustrations. Presented by the Australian Museum, Sydney.*

Fiji. **Allardyce.**

Fiji. Annual Report for 1898. Colonial Reports, Annual No. 268, 1899. Size 10 × 6, pp. 24. *Price* 1½*d.*

Kerguelen Island. *P.R.S. Victoria* **11** (1899): 209–213. **Hogg.**

A Contribution to the Petrology of Kerguelen Island. By Evelyn G. Hogg.

The rocks described were obtained in 1898 by Mr. Robert Hall, who was on board a whaling vessel which touched at Howe island, Greenland harbour, Royal sound, and "Cat's Ears."

New South Wales. ———

Annual Report of the Department of Mines and Agriculture, New South Wales, for the Year 1898. Sydney, 1899. Size 13½ × 8½, pp. 204. *Plans, etc.*

New South Wales—Copper. **Carne.**

The Copper-Mining Industry and the Distribution of Copper Ores in New South Wales. By J. E. Carne. New South Wales. Department of Mines and Agriculture. Geological Survey: Mineral Resources. No. 6. Sydney, 1899. Size 10 × 6½, pp. 198. *Map and Plates. Price* 2*s.* 6*d. Presented by the Geological Survey, New South Wales.*

A complete history of copper-mining in New South Wales, with full particulars of the present state of the industry, which has entered on a period of renewed prosperity since 1894.

New Zealand. *G.Z.* **5** (1899): 609–618. **Jung.**

Die wirtschaftlichen Verhältnisse Neuseelands. Von Dr. Emil Jung.

On the economic conditions of New Zealand.

POLAR REGIONS.

Antarctic. *Verh. Ges. Erdk. Berlin* **26** (1899): 320–322. ———

Das Expeditionsschiff für die geplante deutsche Südpolar-Forschung.

Antarctic. *Petermanns M.* **45** (1899): 240–241. **Borchgrevink.**

Borchgrevinks antarktische Expedition auf dem "Southern Cross."

Antarctic. *Naturw. Wochenschrift* **14** (1899): 477–483. **Drygalski.**

Ueber die wissenschaftliche, praktische und nationale Bedeutung der Deutschen Südpolar-Expedition. Von Prof. Dr. Erich von Drygalski. *With Map.*

Antarctic. *Meteorolog. Z.* **16** (1899): 472–473, 474–475. **Hann.**

Vorläufige Ergebnisse der meteorologischen Beobachtungen der belgischen antarktischen Expedition. Von J. Hann.

Antarctic Exploration. **Buchanan.**

On the Physical and Chemical Work of an Antarctic Expedition. By J. Y. Buchanan, F.R.S. (From the *Geographical Journal* for November, 1899.) Size 10 × 6½, pp. 8.

Arctic. *Rev. Scientifique* **12** (1899): 711–718. **Rabot.**

Un précurseur de Nansen au xvi^e^ siècle. Par M. Ch. Rabot.

On the voyages of Barents.

Arctic—Whaling. **Lindeman.**

Abhandlungen des Deutschen Seefischerei-Vereins. Herausgegeben vom Deutschen Seefischerei-Verein. Band IV.: Die gegenwärtige Eismeer-Fischerei und der Walfang. Von Dr. Phil. M. Lindeman. Berlin: Otto Salle, 1899. Size 13½ × 11, pp. viii. and 134. *Presented by the Author.*

A treatise on sea-fisheries in arctic waters, with special reference to whaling.

East Greenland. *Petermanns M.* **45** (1899): 241–243. **Nathorst.**

Die schwedische Expedition nach Ostgrönland 1899. Von Prof. A. G. Nathorst.

North-West Passage. ——

The Story of the North-West Passage, as told by the Early Explorers. London: T. Nelson & Sons, 1899. Size 6½ × 4½, pp. 80. *Map and Illustrations. Price* 4*d. Presented by the Publishers.*

A series of quotations from Hakluyt and Purchas, with occasional notes, giving an account of the early search for the North-West Passage in a form adapted for use as a Reader in elementary schools. The illustrations (so far as they are reproductions of contemporary woodcuts) are good.

MATHEMATICAL GEOGRAPHY.

Contour-Maps. *Globus* **76** (1899): 281–283. **Kahle.**

Zur Entnahme von Höhen aus Karten mit Höhenlinien. Von P. Kahle.

On the method of reading and utilizing contour-maps.

Geodesy. ——

Jahresbericht des Direktors des königlichen Geodätischen Instituts für die Zeit von April 1898 bis April 1899. Potsdam, 1899. Size 9½ × 6½, pp. 26.

Navigation. ——

Navigation Made Easy. A great improvement over the old Mercator or Mid-Latitude Method. Kirby's Great Circle Navigator. The True Natural Course Indicator for quick and accurate shaping of courses under all Circumstances. 1899. Size 9 × 7½, pp. 8. *Illustrations.*

Description of an instrument by which the great-circle course between any two points can be obtained by taking account of the ship's position at the time.

Position at Sea. *Nautical Mag.* **68** (1899): 759–767. **Goodwin.**

Raper's Approximate Solution of the Double Altitude. By H. B. Goodwin.

Position at Sea. *Nautical Mag.* **68** (1899): 724–742. **Plumstead.**

Notes on Lunars, Sumners, and Double Altitudes. By E. Plumstead.

Prime Meridian. *Mouvement G.* **16** (1899): 457–460. ——

L'adoption du méridien initial de Greenwich par la France.

Notes on the various prime meridians which have been employed at different times.

PHYSICAL AND BIOLOGICAL GEOGRAPHY.

Climates. **Manson.**

The Evolution of Climates. By Marsden Manson. (From the *American Geologist*, vol. xxiv., August, September, and October, 1899.) Size 9½ × 6, pp. [58]. *Map. Presented by the Author.*

Forests and Water Supply. *Meteorolog. Z.* **16** (1899): 469–472. **Bühler, etc.**

Untersuchungen über den Einfluss des Waldes auf den Stand der Gewässer.

On the suggestions of Bühler, Ebermayer, Hoppe, and Müttrich for a scheme of investigation of the influence of forests on the rainfall and drainage of a district.

Glaciers. **Richter.**

Commission Internationale des Glaciers. Les variations périodiques des Glaciers. Quatrième Rapport, 1898, rédigé par E. Richter. (Extrait des *Archives des Sciences physiques et naturelles*, t. viii., 1899.) Genève: Georg & Cie., 1899. Size 10 × 6½, pp. [32]. *Presented by the Publishers.*

Mountains. **Gukassian.**

Ueber den Parallelismus der Gebirgsrichtungen mit besonderer Berücksichtigung der Hauptrichtungen des hercynischen Systems. Von A. Gukassian.—Wissen-

schaftliche Veröffentlichungen des Vereins für Erdkunde zu Leipzig. Vierter Band. Beiträge zur Geographie des mittleren Deutschland, Herausgegeben . . . von Friedrich Ratzel. Leipzig: Duncker & Humblot, 1899. Size 10 × 6½, pp. 195–279.

On the direction of mountain chains.

Oceanography— *J. Geology* **7** (1899): 585–618. **Tolman.**

The Carbon Dioxide of the Ocean and its Relations to the Carbon Dioxide of the Atmosphere. By C. F. Tolman, jun.

Oceanography ———

Conférence Internationale pour l'exploration de la mer, réunie à Stockholm, 1899. Stockholm, 1899. Size 9 × 8, pp. lvi. and 28. *Maps.*

A summary of this official report was given in the *Journal* for December, 1899, vol. xiv. p. 646.

Oceanography. *Geolog. Mag.* **6** (1899): 559–566. **Spencer.**

Mr. Hudleston "On the Eastern Margin of the North Atlantic Basin." By Prof. J. W. Spencer.

A critical paper on the continental margins of Europe, with remarks on the methods of expressing and representing depths on maps. The argument is confused by a misprint, "isobar" for "isobath."

Oceanography. *C. Rd.* **129** (1899): 891–893. **Thoulet.**

Sur une expérience relative aux courants sous-marins. Note de M. J. Thoulet.

The experiments consisted in the use of a number of floats coupled together in pairs by lines of different lengths, the lower bottle of each pair being loaded so as to keep the line stretched.

Terrestrial Magnetism. **Pochettino.**

Atti R.A. Lincei Rendiconti **8**, 2 Sem. (1899): 204–212.

Se e come la forza magnetica terrestre varii coll' altezza sul livello del mare. Nota di A. Pochettino.

Volcanic Islands. **Grosser.**

Geologische Betrachtungen auf vulkanischen Inseln. Von Paul Grosser.—Sonder-Abdruck aus den Verhandlungen des naturhistorischen Vereins der preuss. Rheinlande, Westfalens und des Regierungsbezirks Osnabrück. 56 Jahrgang, 1899. Size 8½ × 5½, pp. 50–68. *Presented by the Author.*

On the volcanic islands visited during a voyage round the world.

Zoogeography. *A travers le Monde, Tour du Monde* **5** (1899): 325–326. ———

Migrations d'Animaux. L'Invasion du Hamster en France. *With Map.*

GENERAL.

Ballooning. *B.S.G. Italiana* **12** (1899): 561–572. **Roncagli.**

La Spedizione Andrée e la nautica nell' aria. Nota di G. Roncagli.

Bibliography. ———

Catalogue No. 3 of Second-hand Books and Manuscripts. Being a Collection of rare volumes relating chiefly to Spanish America. For sale at affixed prices. By W. W. Blake, Gante 8, City of Mexico. Mexico, 1899. Size 9 × 5½, pp. 156. *Presented by the Publishers.*

This catalogue contains a large number of works on America.

British Colonies. ———

Combined Circulars on Canada, the Australasian and South African Colonies. Issued by the Emigrants' Information Office. January, 1900. Size 8½ × 5½, pp. 18, 46, and 16. *Sketch-Maps.*

Commercial Geography—Indiarubber. *B.S. d'Études colon.* **6** (1899): 165–261. **Morris.**

Plantes produisant le caoutchouc du commerce. Par D. Morris, traduction de L. Pynaert. *With Map and Illustrations. Also separate copy.*

Educational. *Petermanns M.* **45** (1899): 235–238. ———

Der geographische Unterricht an den deutschen Hochschulen im Wintersemester 1899–1900.

The programme of the German University courses in geography for the winter session.

Educational. *J.R. Colonial I.* **31** (1899): 45–50. **Andrews.**

The Empire and Geographical Teaching. By Arthur W. Andrews.

Educational—Methods. *J. School G.* **3** (1899): 337–351. **Reilly.**

Geography in Model Department, Normal School, Trenton, N.J. By Susan A. Reilly.

On work in practical geography for junior classes.

Geographical Congress. *Naturw. Wochenschrift* **14** (1899): 489–495. ——

VII. Internationaler Geographen-Congress Berlin, 28 September bis 4 Oktober 1899.

This report, continued in subsequent numbers, reprints all the abstracts of papers read at the Berlin Congress in the language in which they were presented.

Geographical Congress. *Verh. Ges. Erdk. Berlin* **26** (1899): 364–391. ——

Bericht über die feierliche Eröffnung des Siebenten Internationalen Geographen-Kongresses.

Geographical Congress. *Questions Dipl. et Colon.* **8** (1899): 267–275. **Bernard.**

Le Congrès international de Géographie de Berlin. Par Augustin Bernard.

A good summary of the work of the Congress at Berlin in 1899, but marred by some words out of harmony with the cosmopolitan spirit of such a gathering; words which are quoted without any expression of disapproval.

Geographical Progress. **Jüttner and Paulitschke.**

Deutsche Rundschau G. **21** (1899): 552–564.

Fortschritte der geographischen Forschungen und Reisen im Jahre 1898. 3. Amerika. Von Dr. J. M. Jüttner. 4. Afrika. Von Dr. Ph. Paulitschke.

Mountaineering. **Zurbriggen.**

From the Alps to the Andes, being the Autobiography of a Mountain Guide. By Mattias Zurbriggen. London: T. Fisher Unwin, 1899. Size 9 × 6, pp. xv. and 270. *Illustrations. Price* 10*s.* 6*d. Presented by the Publishers.*

The famous Alpine guide who writes this narrative of his life's excursions has had a remarkably wide, in fact a unique, experience of mountains, not only in his alpine home, but in the Himalayas, the New Zealand Alps, and the Andes. Zurbriggen can boast of more high climbs than any other man, for he accompanied Sir Martin Conway in the Karakorum and Mr. Fitz Gerald on Aconcagua. It is interesting to note the matter-of-fact way in which this professional climber recounts his remarkable achievements.

Peace-Conference. ——

Miscellaneous, No. 1 (1899). Correspondence respecting the Peace Conference held at the Hague in 1899. London: Eyre & Spottiswoode, 1899. Size 13½ × 8½, pp. vi. and 356. *Price* 2*s.* 10½*d.*

Royal Navy. **Clowes.**

The Royal Navy, a History from the Earliest Times to the Present. By Wm. Laird Clowes, assisted by Sir Clements Markham, K.C.B., Captain A. T. Mahan, U.S.N., H. W. Wilson, Theodore Roosevelt, E. Fraser, etc. Vols. i.–iv. London: Low & Co., 1897–1899. Size 11 × 8, pp. (vol. i.) xxiv. and 698; (vol. ii.) xiv. and 594; (vol. iii.) xx. and 610; (vol. iv.) xiv. and 624. *Portraits, Maps, Charts, and Illustrations. Price* £5.

Sir Clements Markham contributes the chapters on exploration by naval officers.

Travels. **Oertel.**

Die Naturschilderung bei den Deutschen Geographischen Reisebeschreibern des 18. Jahrhunderts. Inaugural-Dissertation zur Erlangung der Philosophischen Doktorwürde bei der Philosophischen Fakultät der Universität zu Leipzig, eingereicht von Karl Otto Oertel. Size 9 × 6, pp. 92. *Presented by Prof. Ratzel.*

On the German travellers and writers of descriptive geographical works of the eighteenth century, from Johann Peter Kolb to Alexander von Humboldt.

NEW MAPS.

By J. COLES, *Map Curator*, R.G.S.

EUROPE.

Austria-Hungary. **Artaria.**

Artaria's Eisenbahn- und Post-Communications-Karte von Oesterreich-Ungarn. Verlag von Artaria & Co., Wien, 1900. Mit Stationsverzeichnis. Scale 1 : 1,700,000 or 18·8 stat. miles to an inch. *Price* 1 *fl.*

England and Wales. **Ordnance Survey.**

Publications issued since December 8, 1899.

6-inch—County Maps:—

ENGLAND AND WALES (revision): — **Cheshire,** 3 N.E., 13 N.E., 21 N.E., N.W., S.E., 30 N.W., 30A N.E., 53 S.E., 59 N.E. **Derby,** 20 S.W., 28 N.W., N.E., S.W., 29 N.W., N.E., S.E. **Nottinghamshire,** 13 S.W. **Surrey,** 5 complete, 6 N.W., S.W., N.E., S.E., 7 S.W., S.E., 16 N.W., S.W., S.E., 17 N.W., S.W., S.E., 17 N.W., N.E., S.W., 18 complete, 19 N.W., S.W., S.E., 27 complete, 28 complete, 29 N.W., N.E., S.E., 30 complete, 31 complete, 32 S.W., S.E., 40 complete, 41 complete, 42 complete, 43 N.W., S.W., S.E., 44 N.W., N.E., 45 complete, 46 N.W., S.W., S.E., 54 complete, 55 complete, 56 complete, 57 N.W., S.W., S.E., 58 N.E., S.W., 59 N.W., N.E., S.W., 67 complete, N.W., S.W., 69 complete, 70 N.W., S.W., N.E., S.E., 71 N.W., N.E., 78 N.W., N.E., S.E., 79 complete, 80 N.W., N.E., 82 N.E., 83 N.W. **Westmorland,** 5 S.E., 6 N.W., N.E., 8 N.E., S.W., S.E., 9 S.E., N.E., S.W., 11 S.W., 12 S.E., 13 N.W., S.E., 14 S.W., 15 N.E., 16 N.E., 20 N.E., 24 S.E., 26 N.E., S.W., 29 S.E., 32 N.W., N.E., 47 S.W. 1*s. each.*

25-inch—Parish Maps:—

ENGLAND AND WALES (revision):—**Berkshire,** IV. 4, 12; XIX. 1, 9; XXV. 1, 5, 12, 14, 15, 16; XXVIII. 12; XXXIV. 1, 5, 7, 13, 14, 15, 16; XXXV. 10, 14, 15, 16; XXXVII. 1, 2, 6, 7, 8; XLV. 9; XLIX. 4; L. 1. **Bucks,** XVII. 4; XVIII. 5, 7, 10, 11, 14, 15, 16; XIX. 10, 11, 13, 14, 15, 16; XX. 9, 10, 13, 14; XXI. 4, 8, 11, 12, 16; XXII. 1, 7; XXXIII. 11; XXIV. 8, 12, 13; XXVI. 4, 8; XXVIII. 15, 16; XXX. 7. **Cumberland,** XLVIII. 5, 10, 11, 12, 13, 14, 15, 16; XLIX. 9, 10, 13; LIV. 13; LV. 6, 7, 8, 10, 11, 12; LVI. 5, 13; LVIII. 2, 3, 4, 7, 8. **Derbyshire,** XXXVIII. 1. **Denbighshire,** IV. 4; V. 1; VIII. 5; XIII. 1, 4, 14; XVII. 3, 8; XVIII. 1, 3, 4, 5, 15, 16; XIX. 1, 2, 3, 4, 8, 9, 10, 11, 12, 13, 14; XXVI. 2, 3, 4, 6, 7, 8, 10, 11, 13 and 14, 15, 16; XXVII. 13; XXVIII. 6, 10, 12; XXXIII. 3, 4, 8, 12, 16; XXXIV. 5, 9; XXXV. 10; XXXIX. 1, 11, 14; XL. 1, 11, 12; XLI. 15; XLII. 1, 5, 16; XLIII. 8, 16; XLIV. 2, 3, 5, 6, 7, 9, 10, 11, 13, 14, 15; XLV. 4; XLVI. 1. **Glamorganshire,** X. 7, 8; XI. 13; XXVII. 10, 15; XXXV. 1, 2, 3, 5, 6, 9, 14, 15; XLI. 1. **Nottinghamshire,** X. complete, 16 sheets; XI. 1, 5, 9, 13; XV. 2, 9; XVI. 1; XIX. 2, 3, 4, 7, 9, 10, 11, 12, 13, 14, 15, 16. **Oxfordshire,** XIV. 15, 16; XVII. 4; XIX. 4, 7, 8, 11, 12; XX. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 15, 16; XXI. 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16; XXII. 6, 7, 9, 10, 11, 12, 13, 14, 15, 16; XXIII. 4, 6, 8, 11, 12, 14, 16; XXV. 4; XXVI. 2, 7, 8, 11, 12 XXVII. 1, 2, 3, 4, 5; XXVIII. 4, 8; XXXIII. 11; XXXIX. 4; LV. 12. **Staffordshire,** X. 11; XII. 9; XVII. 1, 9, 12; XIX. 1, 2, 3, 5, 6, 7, 9. **Wiltshire,** II. 15 V. 7, 8, 11; IX. 5, 6, 7, 10, 11; XVII. 9; XXIV. 1, 5, 9, 13, 14. 3*s. each.*

(*E. Stanford, Agent.*)

Germany. **Königl. Preuss. Landes-Aufnahme.**

Karte des Deutschen Reiches. Herausgegeben von der Kartogr. Abtheilung der Königl. Preuss. Landes-Aufnahme, 1899. Scale 1 : 100,000 or 1·6 stat. mile to an inch. Sheets: 306, Burgsteinfurt; 331, Warendorf; 662, Fussen. *Price* 1·50 *marks each sheet.*

Germany. **Langhans.**

Verteilung der landwirtschaftlichen und industriellen Bevölkerung im Deutschen Reiche nach der Berufszählung von 1895. Scale 1 : 5,000,000 or 79 stat. miles to an inch. Paul Langhans. Gotha: Justus Perthes, 1899. *Petermanns Geographische Mitteilungen,* Jahrgang 1899, Tafel 18. *Presented by the Publisher.*

Historical Atlas. **Poole**

Historical Atlas of Modern Europe, from the Decline of the Roman Empire; comprising also maps of parts of Asia and of the New World, connected with European History. Edited by Reginald Lane Poole, M.A., PH.D., Fellow of Magdalen College, and Lecturer in Diplomatic in the University of Oxford. Part xxiv. Oxford: The Clarendon Press; London, Edinburgh, Glasgow, and New York: Henry Frowde, M.A.; Edinburgh: W. & A. K. Johnston. 1899. *Price* 3*s.* 6*d.* *Presented by the Clarendon Press.*

This part contains: Map 14, Europe, 1863–1897, by G. W. Prothero, LITT.D.; Map 28, Scotland, showing the Principal Clans and Families, and also the Parliamentary Representation down to 1832, by Robert S. Rait, M.A. (ABERD.), Fellow of New College, Oxford; Map 76, Syria during the period of the Crusades, 1096–1291, by T. A. Archer, B.A. Each of these maps is accompanied by explanatory letterpress.

ASIA.

North Celebes. **Bücking.**

Geologische Skizze von Nord-Celebes. Nach eigenen Beobachtungen und älteren Angaben von J. van Schelle, P. und F. Sarasin u. a. Zusammengestellt von H. Bücking. Scale 1: 2,000,000 or 31·6 stat. miles to an inch. Nordöstlicher Teil von Minahassa. Scale 1: 500,000 or 7·8 stat. miles to an inch. Distrikt Langowan. Scale 1: 200,000 or 3·6 stat. miles to an inch. Gotha: Justus Perthes, 1899. *Petermanns Geographische Mitteilungen*, Jahrgang 1899, Tafel 16. *Presented by the Publisher.*

AFRICA.

French West Africa. **Service Géographique des Colonies.**

Carte de la Mission Blondiaux, 1897–98. Scale 1: 250,000 or 3·9 stat. miles to an inch. Service Géographique des Colonies. Paris: H. Barrère. 4 sheets. *Presented by the Ministère des Colonies.*

The country included in this map is part of the region between the French Sudan and the Ivory Coast. The map is drawn with considerable detail, showing, approximately, the physical features of the country, positions of villages and cultivations, together with the routes followed by the mission, as well as those used in the ordinary course of trade. As this map embraces a considerable area of a very little-known part of Africa, it seems to have been a great oversight to publish it without any graduation for latitude and longitude.

German South-West Africa. **Langhans and Fleck.**

Langhans' Beitrage zur Kenntnis der deutschen Schutzgebiete. Nr. 16. Reise ins Tsauchab-Thal (Deutsch-Südwest-Afrika) von Dr. Ed. Fleck. Nach seinen Aufnahmen und Breitenbestimmungen. Scale 1: 500,000 or 7·8 stat. miles to an inch. Rehoboth-Hoornkrans-Naauwkloof. Scale 1: 1,000,000 or 15·8 stat. miles to an inch. Gotha: Justus Perthes, 1899. *Petermanns Geographische Mitteilungen*, Jahrgang 1899, Tafel 17. *Presented by the Publisher.*

Niger. **Hourst.**

Cours du Niger de Tombouctou à Boussa. Levé expédié exécuté en 1896 par M. M. Hourst, Lieut. de Vaisseau Baudry, Enseigne de V^{eau} et Bluzet, Lieut. d'Infant^{ie} de Marine. Publié pour le Ministére des Colonies. Service Hydrographique de la Marine, 1899. Scale 1: 50,000 or 0·8 stat. miles to an inch. 50 sheets. *Presented by the Ministère des Colonies.*

This map, consisting of fifty sheets, gives the results of the running survey made by Lieut. M. M. Hourst and his companions between Timbuktu and Bussa. Soundings along the course of the river between these points are given in metres, except in such portions of it where rapids rendered sounding impossible. Many heights of prominent points along the banks of the river are given, and the features of the surrounding country have, to a certain extent, been sketched in.

AMERICA.

Argentine Republic. **Buenos Aires and Pacific Railway Co., Ltd.**

Map of the Argentine Railways, 1899. Scale 1: 2,851,200 or 45 stat. miles to an inch. Buenos Aires and Pacific Railway Co., Ltd., London. *Presented by the Publishers.*

This map, which has been issued by the Buenos Aires and Pacific Railway Company, shows the present state of railway enterprise in Argentina. The lines belonging to the Government and the different railway companies are distinguished by the manner in which they are drawn, and the gauges on which they are constructed are also indicated.

West Indies. **Service géographique de l'Armée.**

Amerique. Scale 1,000,000 or 15·8 stat. miles to an inch. Sheets: Haïti and Porto-Rico. Service géographique de l'Armée, Paris.

GENERAL.

World. **Meyer.**

Meyer's Hand-atlas. Zweite, neubearbeitete und vermehrte Auflage mit 112 Kartenblättern, 9 Textbeilagen und Register aller auf den Karten verzeichneten Namen. Parts 37 and 38 (in one). Leipzig und Wien. Verlag des Bibliographischen Instituts, 1899. *Price 60 pf. each issue.*

CHARTS.

United States Charts. **U.S. Hydrographic Office.**

Pilot Charts of the North Pacific Ocean for December, 1899, and January, 1900, and of the North Atlantic Ocean for December, 1899. Published at the Hydrographic Office, Washington, D.C. *Presented by the U.S. Hydrographic Office.*

PHOTOGRAPHS.

Abyssinia, etc. **Wellby.**

One hundred and sixty-two Photographs taken by Captain M. S. Wellby during his journey through Somaliland, Southern Abyssinia, etc., 1899. *Presented by Captain M. S. Wellby.*

The views and scenes are well chosen, and these photographs form a valuable addition to the Society's collection. The following is a list of the titles:—

(1) British Residency at Zeila; (2) Trees at Hargeisa; (3) Somali Khafila crossing plain near Jig Jigga; (4) Harrar, looking from the west; (5) Arrival of M. Legarde, French representative, at Ras Makonnen's palace at Harrar; (6) Captain Harrington's camp at Kalubi; (7) Raskonnen's soldiers outside Captain Harrington's tent; (8) Ras Makonnen leaving Captain Harrington's tent; (9) Valley of Tyalanko; (10) Ras Makonnen's camp at Shola; (11, 12) Villagers bringing dergo to Ras Makonnen; (13) Captain Harrington's and Ras Makonnen's camp at Tullo; (14) An Abyssinian house at Kuni; (15) Hair-dressing in the British agent's camp; (16) M. Legarde and his doolies crossing the bridge over the Hawash river; (17) My canvas boat on the Hawash river; (18) Loading up by the Hawash river; (19) Captain Harrington's mid-day halt at Dobi; (20) Captain Harrington on his road to Addis Abbaba; (21) St. George's church at Addis Abbaba; (22, 22A, B) King Menelik's camp on his way to Tigre; (23) King Menelik's artillery firing a salute in honour of receiving the Queen's message through phonograph; (24, 25) The Russian representative, M. Vlassof and his escort; (26A) The French representative, M. Legarde; (27) Queen Taitu's advanced guard approaching King Menelik's camp; (28) Queen Taitu and her lady attendants on the march; (29) Queen Taitu's rear-guard; (30, 31) King Menelik's camp; (32) McKelvey, family and home; (33) Market day at Addis Abbaba; (34) Horse market at Addis Abbaba; (35) Abyssinians partaking of their favourite food, raw meat; (36) Church of St. Raguel at Entoto; (37) H. B. M.'s agent, Captain Harrington and his escort; (38) Captain Harrington's camp at Addis Abbaba; (39) Madame Vlassof's Cossack orderly; (40) Curagunas building British agency at Addis Abbaba; (41) King Menelik's palace; (42) The ardarash or reception hall in process of construction; (43) Residency of M. Legarde; (44) Shahzad Mir and his pony; (45) My dog "Lady;" (46) The Russian residency at Addis Abbaba, showing M. Legarde and M. and Madame Vlassof; (47, 48) Market day at Walamo; (49) View of Walamo valley north of Damota hill; (50) House at Walamo; (51) Paying Walamo natives for supplies; (52) Shawm-players of Galla chief of Baroda; (53) View of Lake Abai; (54) Post of Fitarawri Imani in Gamo; (55) My camp in Gamo; (56) Fitarawri (General) pays me a visit; (57) My men saluting Fitarawri Imani; (58) A house in Gamo; (59) My caravan descending hill in Gamo; (60) Lake Tukurabai; (61) Hills of Gamo; (62) Fitarawri Degafi

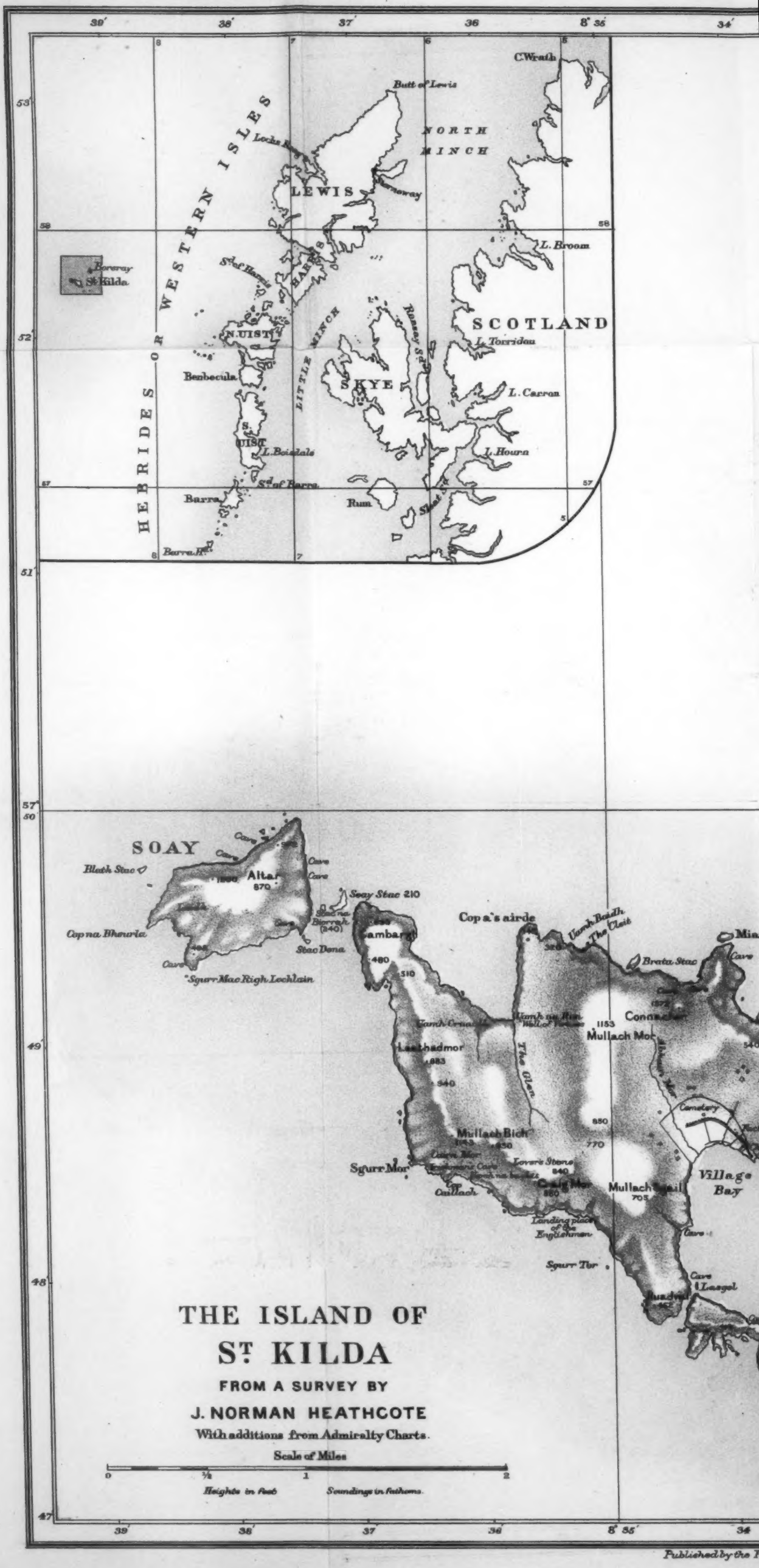
pays me a visit; (63, 64) Hills of Gamo; (65) Katama of Fitarawri Degafi; (66) Lake towards the north; (67) Hill called Algvodi; (68) Valley looking south-west from camp; (69) Glimpse of south end of camp; (70) Camp and distant hills; (71) South end of lake; (72) View of lake; (73) Caravan crossing shallow river; (74) View of a bit of Stefani with corner of Hammer Koki from the north; (75, 76) View of Rudolf shore and waves; (77–79) Elephants; (80) Shore of Lake Rudolf; (81) View of bay; (82) Oryx; (83) View of bay; (84) Herd of Oryx; (85) Rhinoceros with young one; (86) Rhinoceros youngster; (87) My "Lady" to the rescue retrieving duck; (88) Gallopa natives; (89) Natives of Gallopa who refused to leave me; (90, 91) View across Lake Rudolf; (92) View with bird of prey; (93) Dome palms, across lake; (94) Curious hills; (95) Remarkable accumulation of camel-bones, Lake Rudolf; (96) Some of our cattle loaded; (97) Top of pass before meeting Turkana; (98) Turkana giant points out country to Shazad Mir; (99) Two Turkana men; (100) Members of the Abba tribe; (101) Members of the Loka tribe; (102) We find water below river-bed; (103) Kaisuki; (104) Stream with bamboos and Boma guides; (105) View across valley to the east; (106) My Morelli guide; (107) Difficult crossing; (108) Boat crossing Ruzi; (109, 110) Donkeys crossing; (111–113) Camels crossing; (114) Village of Nyuro; (115) Crossing the other animals; (116–118) Crossing another river; (119) Junction of the Ruzi and other river; (120) Shilluk village; (121, 122) Camels being pulled across river; (123) Bringing rope back; (124) Lifting camel into the river; (125) Birds of prey in plain; (126) Pulling donkeys across river; (127) Nuers; (128, 129) Our native boat on the Sobat; (130) Nyuak village; (131) Loading up after crossing stream; (132) Dinka village; (133) Dinka men fishing; (134) Sheikhs Munyan and Shilluks; (135, 136) Crossing last river; (137) A Shilluk boat; (138) Group of Shilluks; (139) Fort Sobat; (140) H.M.S. *Fokh* with Captain Escomb, R.N.; (141) Fashoda fort; (142) Shiek Dugl's camp; (143) Gebelain hills; (144) Bringing wood by boat; (145) Mahomed Hassan, my Somali boy; (146) Nuers and Nyuaks; (147) Dervish fort; (148) Gorge above Wad Hamed Nile; (149) Nile; (150) Palace at Khartum; (151) The Atbara bridge; (152) Resident's house at Atbara; (153) Native craft, Nile; (154) Sirdar's house at Omdurman; (155, 156) Colonel Lewis's pony; (157) Colonel Lewis; (158) Sudanese regiment; (159) Farewell to Omdurman; (160) My dog at Suez; (161) Shahzad Mir at Suez; (162) Last of my dogs at Alexandria.

Angola. **Moraes and Ferreira.**

Thirty-eight Photographs of St. Paul de Loanda, Angola Railway, and surrounding country, by J. Moraes and J. A. M. Ferreira, St. Paul de Loanda, 1898–99.

(1, 2) "English House" stores, Loanda; (3) Office of the "English House," Loanda; (4) Loanda Coaling Company's stores, on island facing Loanda; (5) Loanda Coaling Company's stores and pier; (6) Empreja Nacional (Portuguese Steamship Co.) coaling depôt; (7) Loanda city; (8) Civil and military hospital, Loanda; (9) Bull ring, Loanda; (10) Penedo fortress, entering Loanda harbour; (11) Harbour master's office and stores, Loanda; (12) Governor-General's palace, Loanda; (13) Main street of Loanda; (14) Novo Redondo, Angola; (15) River Bengo, Cabiri, Angola; (16) Royal Trans-African Railway: Loanda station; (17) Public Works, Loanda; (18) Upper city, Loanda; (19) Government offices, Loanda; (20) Stores and terminus of the Royal Trans-African Railway, Loanda; (21) Fortress of S. Michael commanding Loanda harbour; (22) Public gardens, Loanda; (23) Loanda Gas Company's works; (24) Barracks of the 2nd Rifles (Ultramarine), Loanda; (25) Naval station and headquarters, South Atlantic Division, on the island facing Loanda; (26) Royal Trans-African Railway: upper city station, Loanda; (27) Royal Trans-African Railway: Zenza station; (28) Statue of Salvador Correia; (29) Loanda observatory; (30) Church of "Our Lady" on the island in front of Loanda; (31) Sé Cathedral, Loanda; (32) Island in front of Loanda, showing Loanda Coaling Company's store; (33) Praca de D. Pedro V., Loanda; (34, 35) Loanda Coaling Company's depôt, Nazareth, Loanda; (36) The "English House," Loanda; (37, 38) Coffee and cane plantation, Monte Bello, Casengo, Angola.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.



THE ISLAND OF St KILDA

FROM A SURVEY BY

J. NORMAN HEATHCOTE

With additions from Admiralty Charts.

Published by the

33′ 32′ 31′ 8° 30′ 29′ 28′

53′ 52′ 51′ 50′ 49′ 48′ 47′

Stac an Armin
502

BORERAY

Cave

Stellar's R?

Cleagath
705

Stac Lii
535

Scarastac

Miana Stac

Cave

340

Cave

330

Cave

Stuart Rock

Point of Call

DUN

Levenish
190

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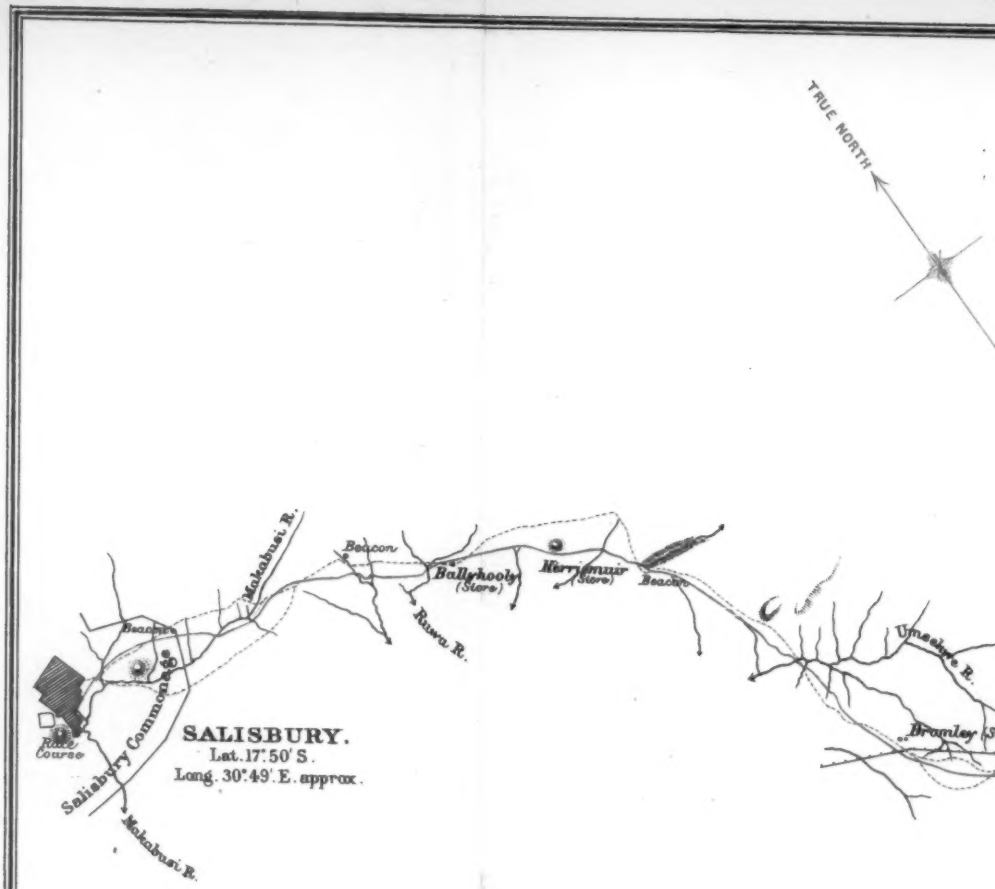
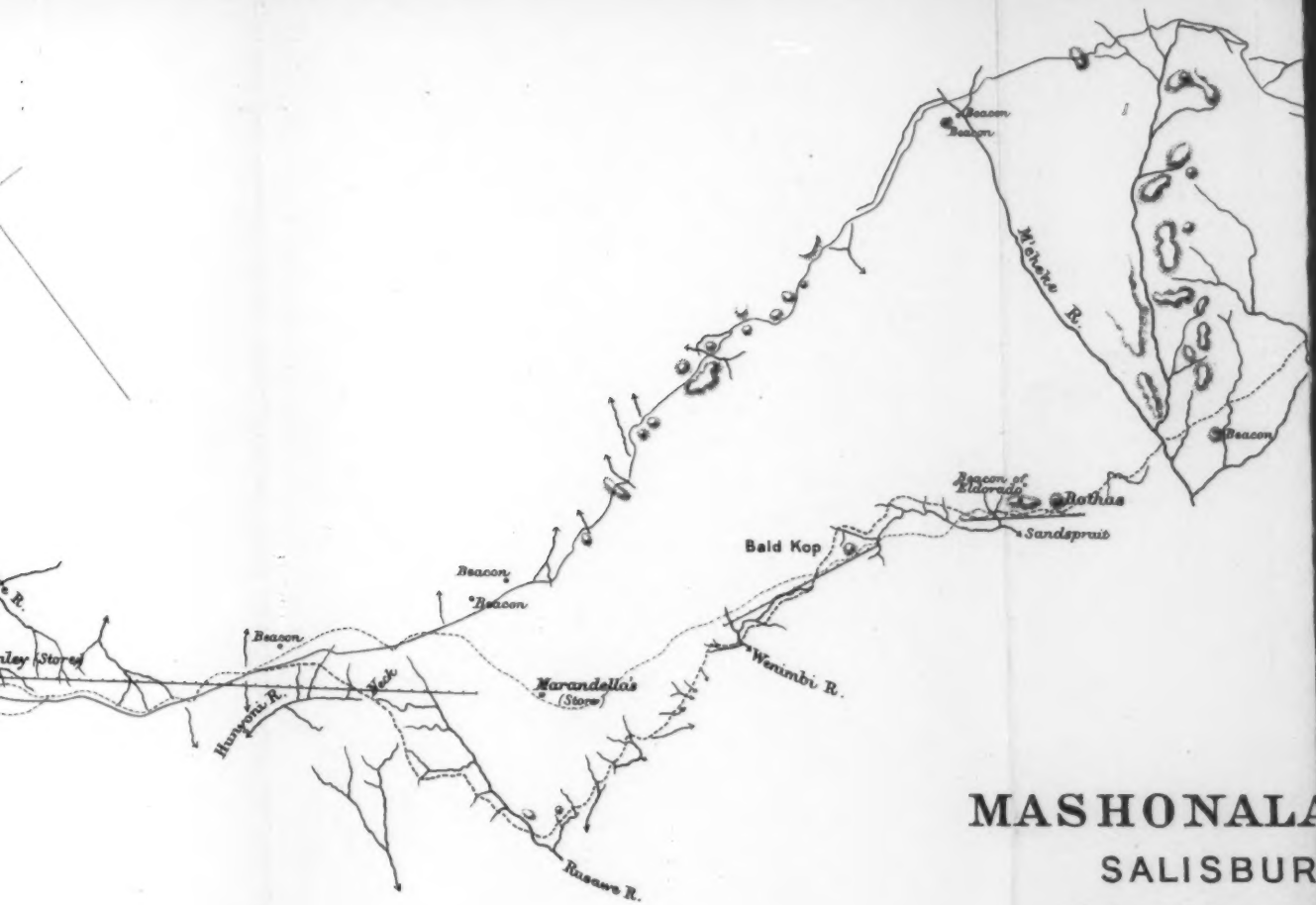

TRUE NORTH
Makabusi R.
Beacon
Ballyhooly
(Store)
Kerrymuur
(Store)
Beacon
Ruwa R.
Umsheshe R.
Bramley
Beacons
Race Course
Salisbury Commonage
SALISBURY.
Lat. 17° 50' S.
Long. 30° 49' E. approx.
Makabusi R.



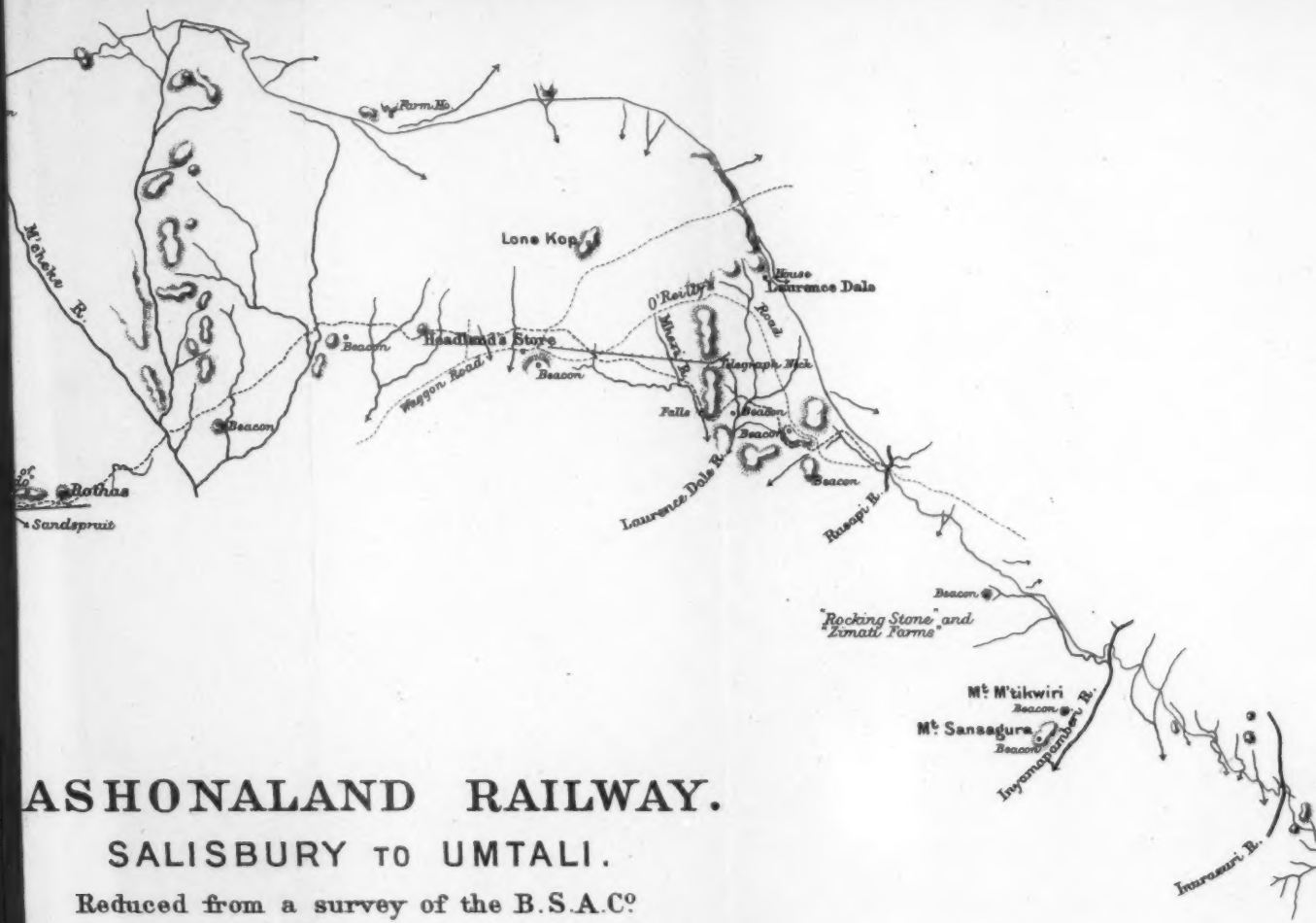
MASHONALA

SALISBUR

Reduced from a s

0 5

Published by the R



ASHONALAND RAILWAY.

SALISBURY TO UMTALI.

Reduced from a survey of the B.S.A.Co

Scale.

0 5 10 15 20 Statute Miles.

Telegraph.
Railway.
Abandoned route.
Waggon road.

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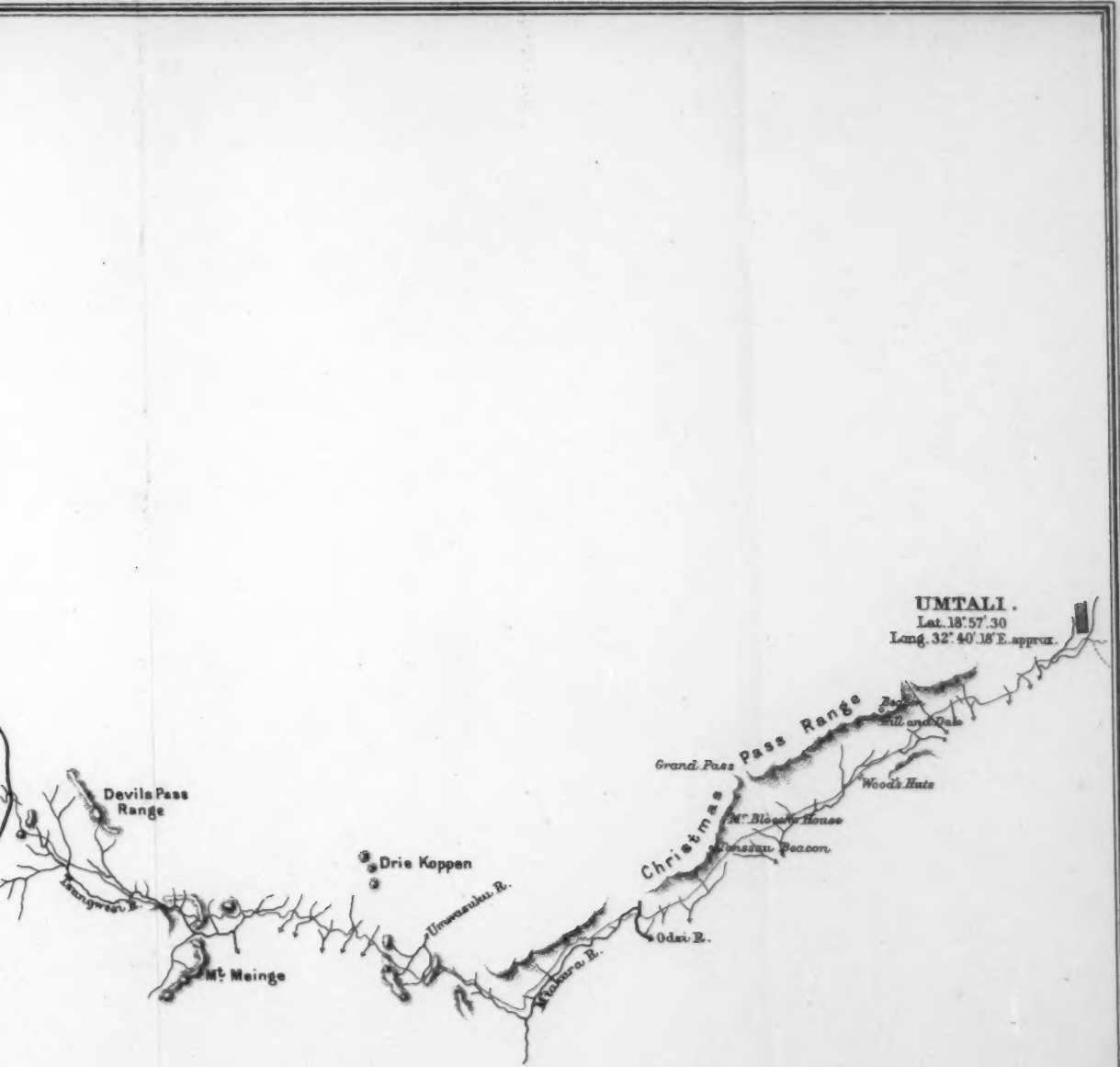
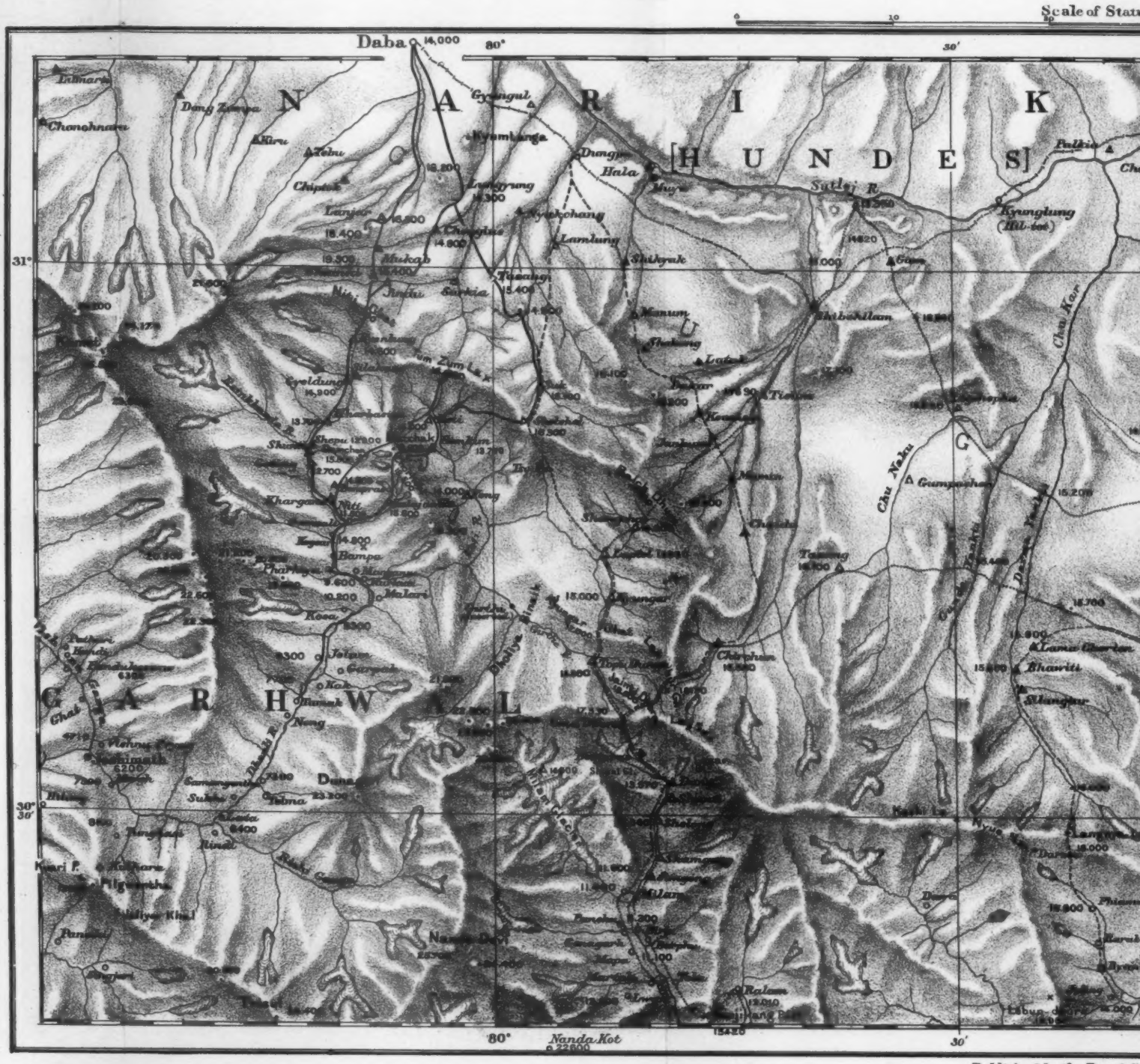
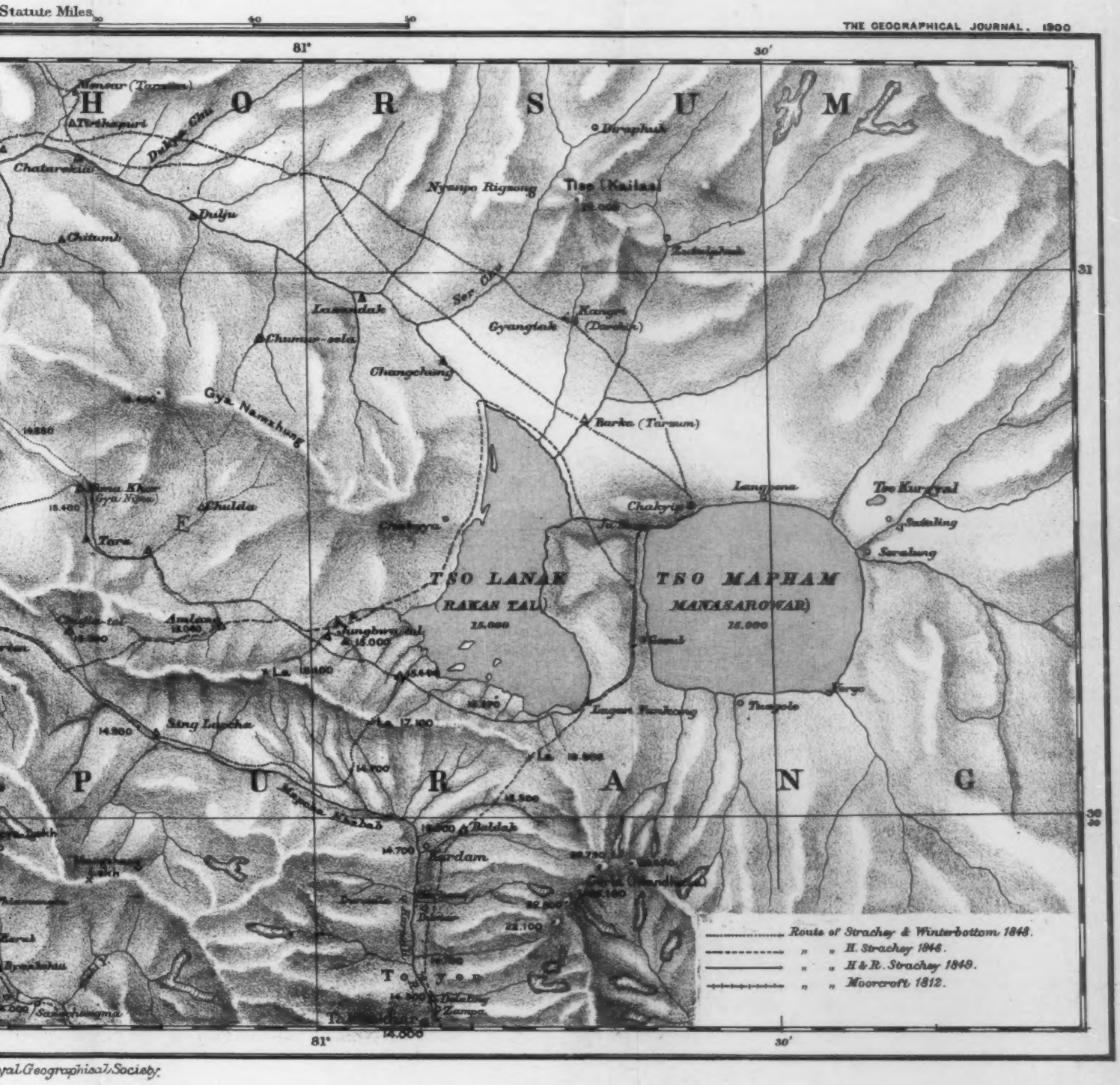


F.S. Weller, F.R.G.S. Del.

MAP OF THE MOUNTAINS ON THE NORTHERN BORDER OF



OF KUMAON AND OF THE ADJACENT PARTS OF TIBET.



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